FEBRUARY 14, 1931

Railway Age

Founded In 1856

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HEADFREE RAIL

6,000 Tons in 1926 to 825,000 Tons

WHY?

Courage of their convictions on the part of the Railroad Engineers

While we have published and distributed data showing the great economy of Headfree Rail, it has been the Railroad Engineers who have recognized this progressive step and have acted. The above figures are given to support them in their judgment and courage.

Trust The Railroad Engineers To Recognize Progress

THE THOMSON RAIL CORPORATION
OF NEW YORK

PENNSYLVANIA BUILDING, PHILADELPHIA

Engineering Materials Limited, McGill Bldg., Montreal, Que.

Alphabetical Index to Advertisers—Page 58

Buyers Directory of Advertisers—Page 51

What ties contain the most VALUE?

THAT is what you must know to get the greatest return on what they cost. To compare prices only is futile. The only sound course to pursue is to investigate the ties and then base your selection on a comparison of actual tie values. In no other way can you be certain that you receive greatest value for your tie dollar.

International ties are stacked on the plant yards ready for your investigation at any time. Come and see them for yourself. You will find them to be large, full bodied ties that have been and are being properly cared for.

International ties are quality ties and in quality ties there is no such thing as a "little bit of decay," as "decay that will be stopped by the treatment" or "decay so slight that the strength of the tie is not impaired." See these ties. Their quality shows!—It will speak for itself!

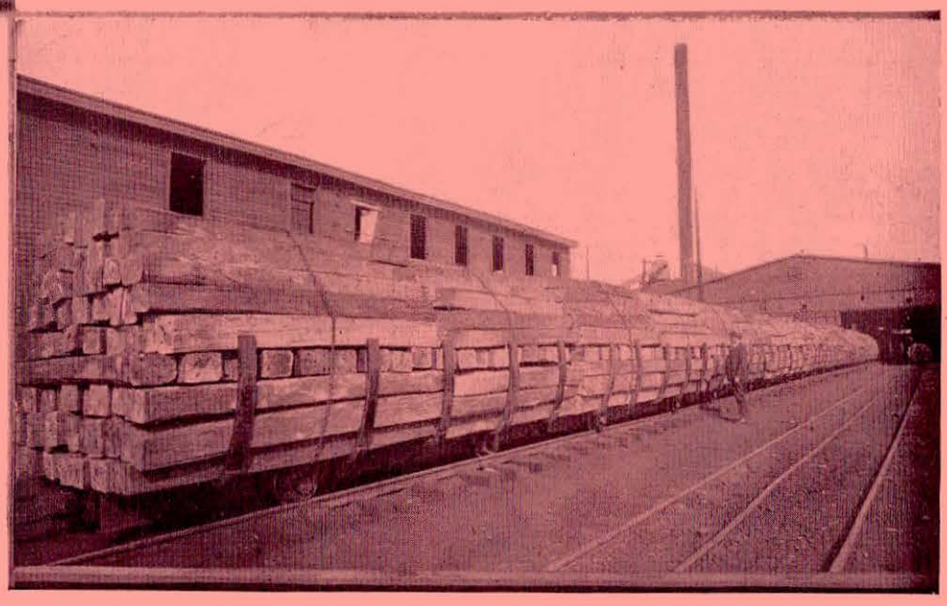
You should try ***International*** ties. You will then benefit from the big economies which accrue from these high quality and truly A. R. E. A. Specification Ties.

International Creosoting & Construction Co.
General Offices: Galveston, Texas
Plants: Texarkana - Beaumont - Galveston

International High Quality Treated Ties

This dating nail is your assurance that the tie is a Standard A.R.E.A. Specification Tie.

Full Size
Sound Timber
Properly Seasoned
Scientifically Treated



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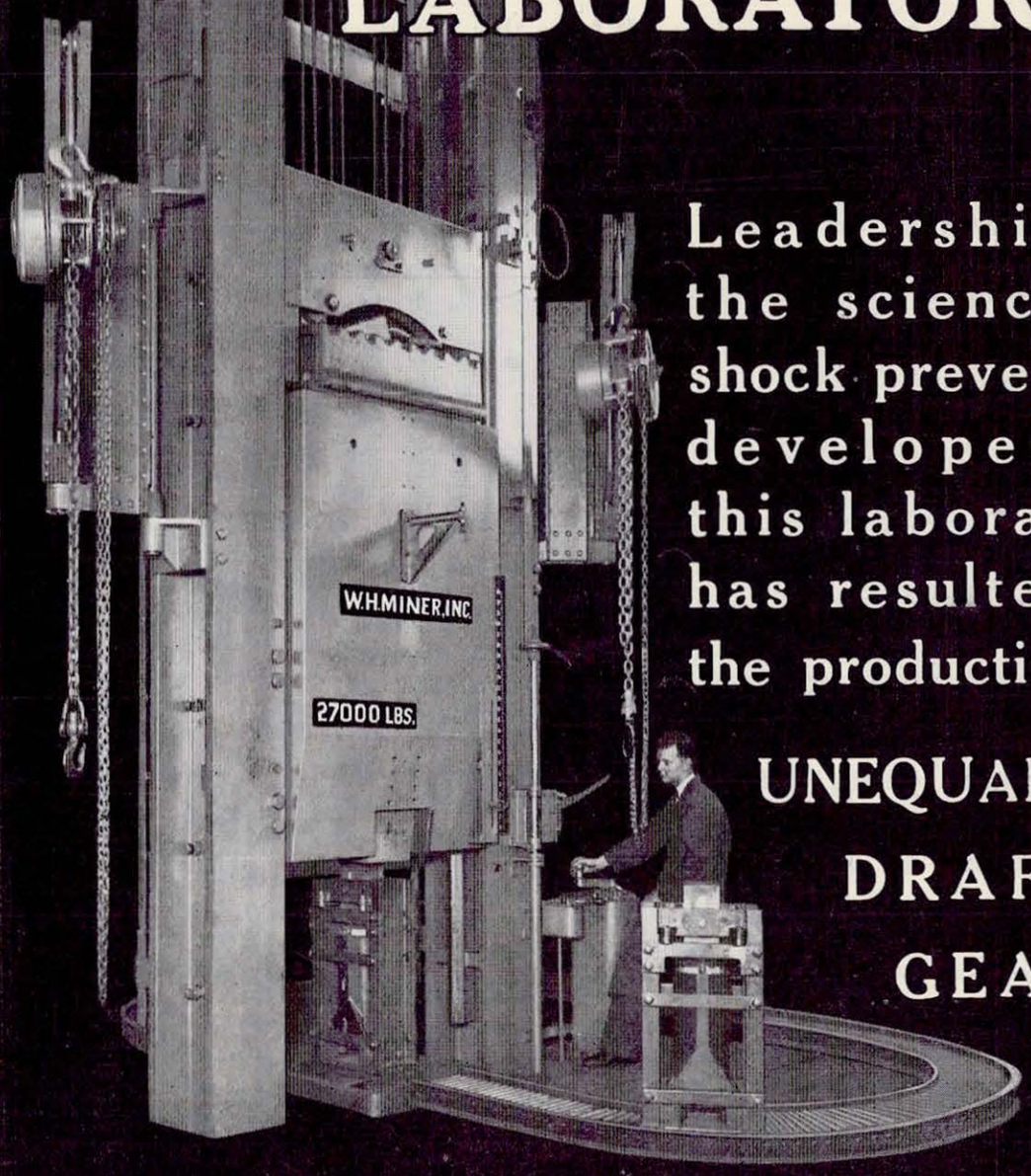
MINER

RESEARCH LABORATORY



Leadership in the science of shock prevention developed in this laboratory has resulted in the production of

UNEQUALLED DRAFT GEARS

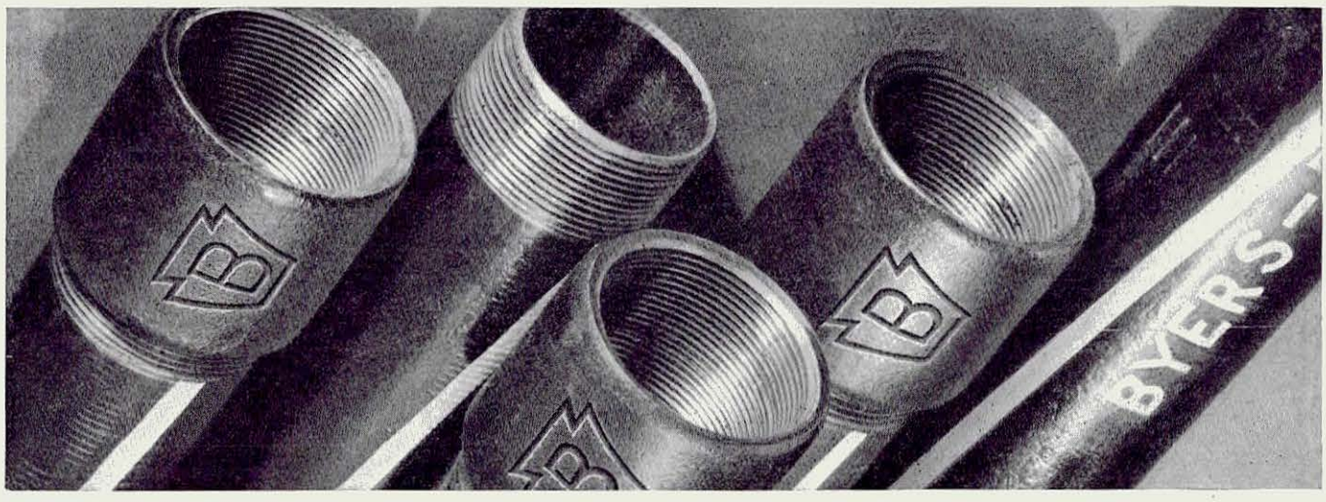
W. H. MINER, INC. CHICAGO

EXPERIENCE!

★ ★ ★

EXPERIENCE is the engineer's most valuable guide in selecting the right pipe for the right place. And experience is the result of coordination of laboratory tests and service data. Where this experience is a guide in the

BYERS • GENUINE • WROUGHT-IRON PIPE



BYERS • GENUINE • WROUGHT-IRON PIPE

formulation of a railroad "pipe prescription," there are definite places for Byers Genuine Wrought-Iron Pipe. Byers is recognized as the standard of wrought-iron quality. It is easily recognized by the Spiral Stripe. A. M. Byers Company, Pittsburgh, Pa. Established 1864.

AN INVESTMENT — NOT AN OUTLAY

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Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name Registered U. S. Patent Office.

Vol. 90 February 14, 1931 No. 7

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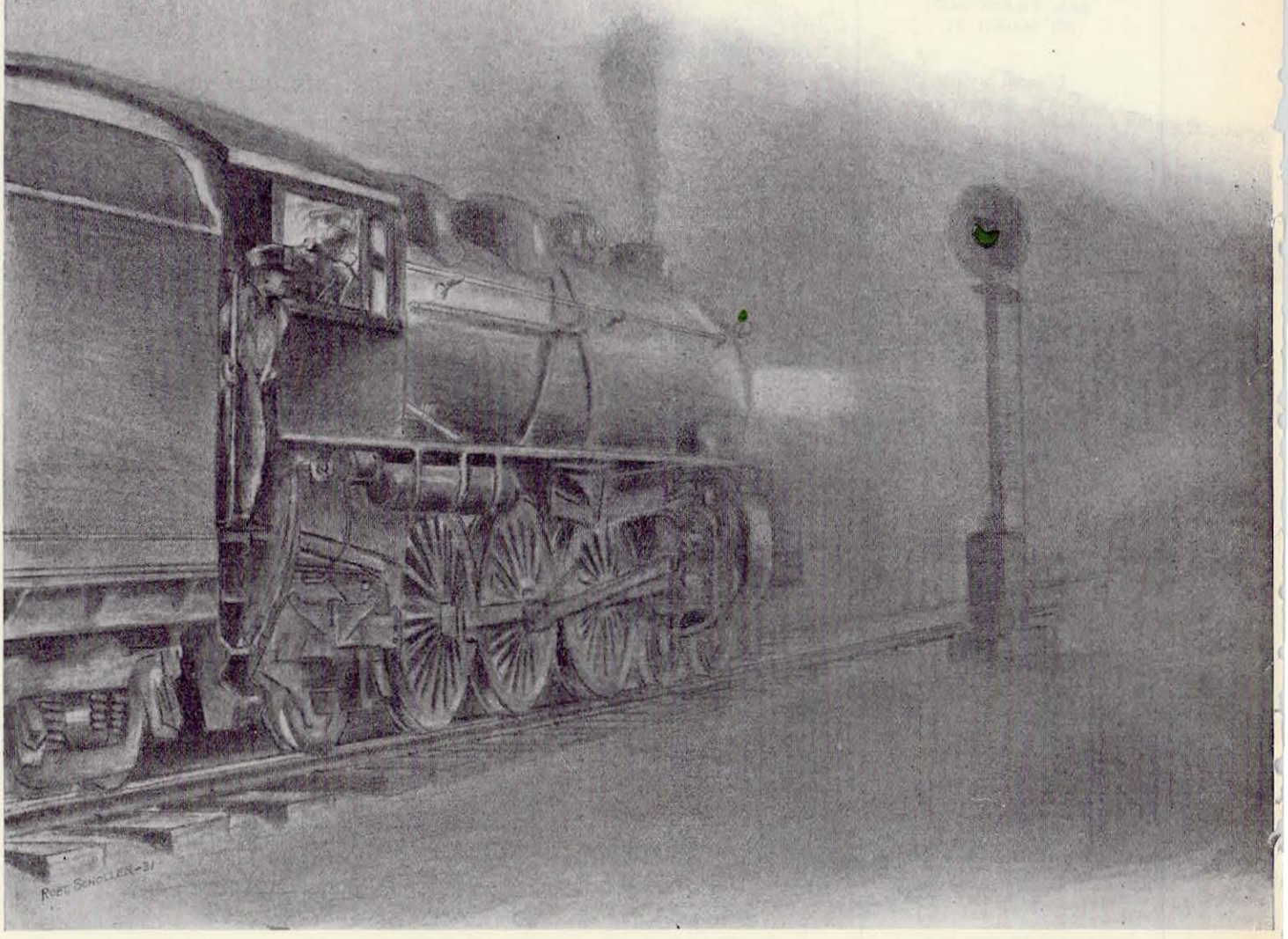
"Lifting" the Slow

"IN each instance the engineman shall take every precaution for the safety of his train." Railroad law! He does not need written "slow orders" in running through a dense fog when view of the roadside signals and right-of-way is dim or obscured. His responsibilities lead him instinctively to slow down the speed of the train, not knowing what obstacle he may run into at any moment. He is groping in the dark. Schedules and running time are, for the time being, forgotten. Added operating expenses and delay occasioned thereby are secondary to safety and precaution.

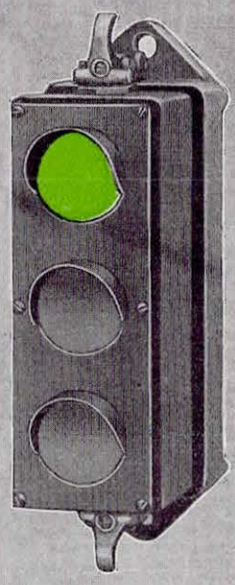


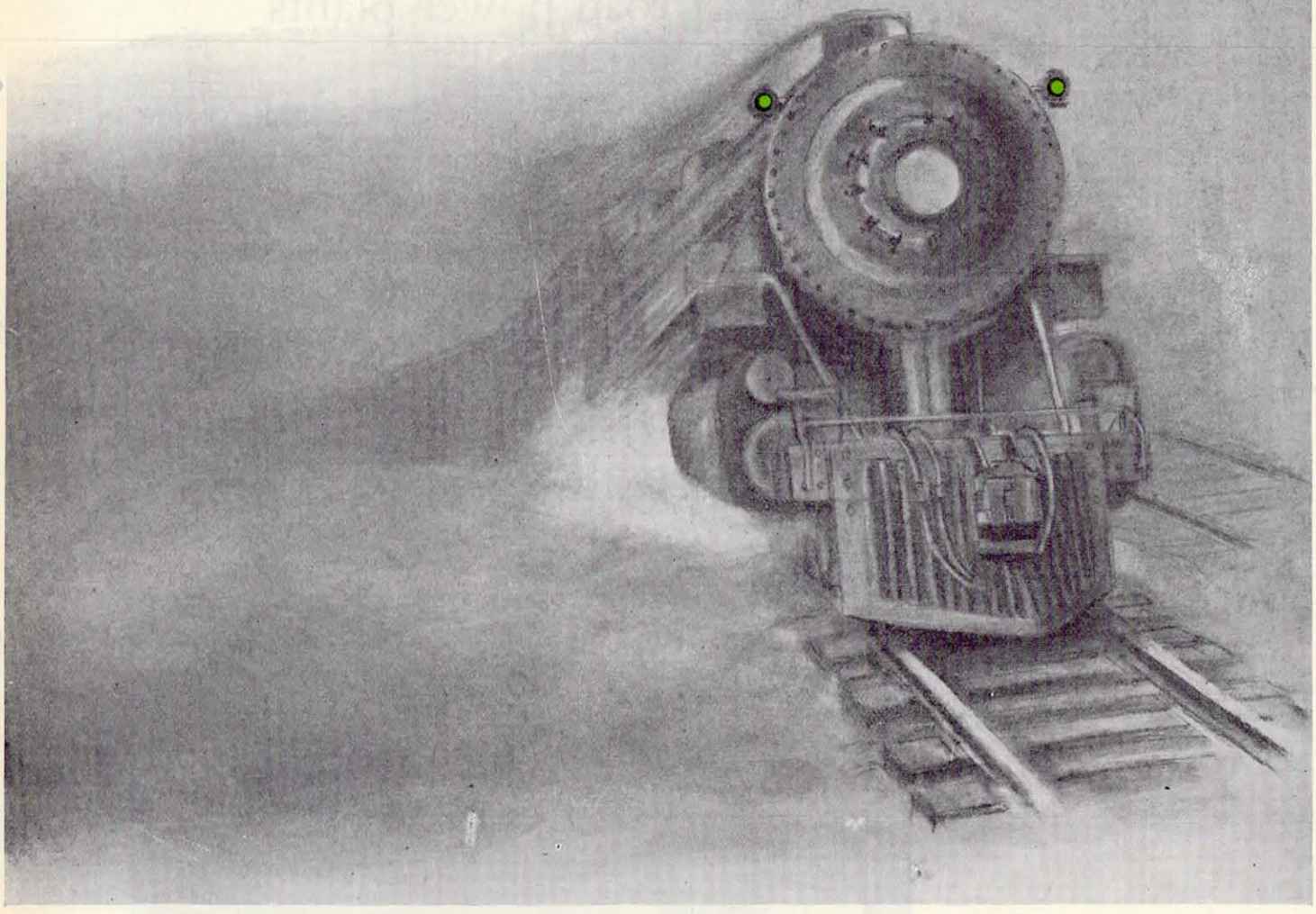
District Offices

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

Orders!

How different on a train whose locomotive is equipped with the "Union" Continuous Cab Signal! Continuously controlled and constantly visible, the cab signal gives the engineman immediate information of changes in the track conditions ahead, regardless of weather conditions. He *knows* the track conditions ahead—whether they are more restrictive or less restrictive—regardless of the position of the train in the block. He has the blindfold removed and runs his train on scheduled speed and at minimum operating cost. Our nearest district office will be glad to furnish you with detailed information.





1881 Union Switch & Signal Co. 1931

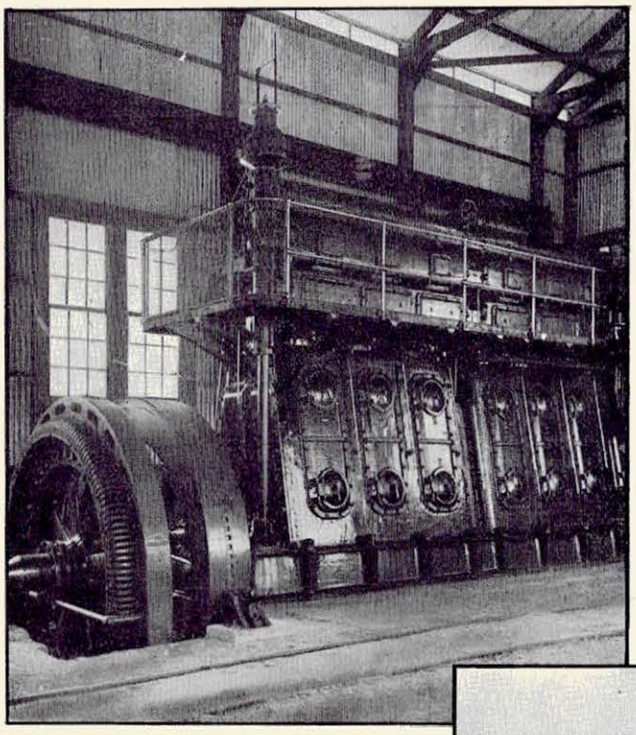
SWISSVALE, PA.

World Industry Gargoyle

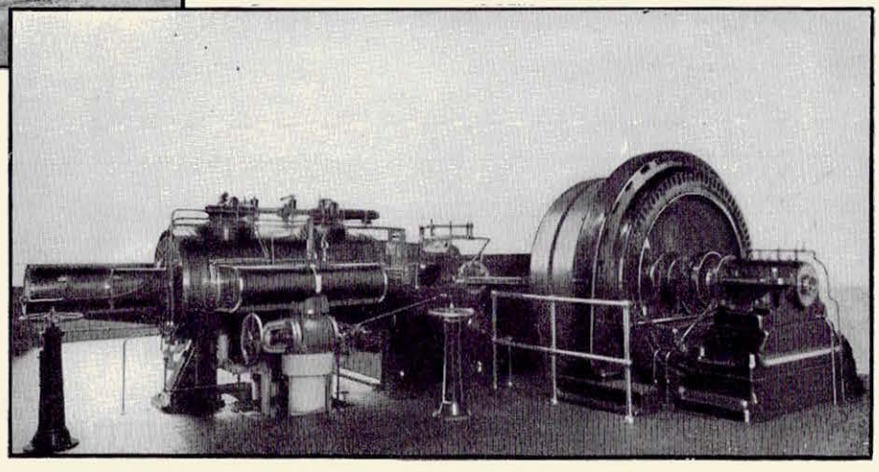
for every type of power equipment used in Railroad power plants

THROUGHOUT the world, leading well-managed industrial plants use the famous Gargoyle Cylinder Oil 600-W for steam cylinder lubrication, and Gargoyle D.T.E. Oils for turbines, air compressors and other important machinery.

Power engineers realize that Correct Lubrication produces power at less

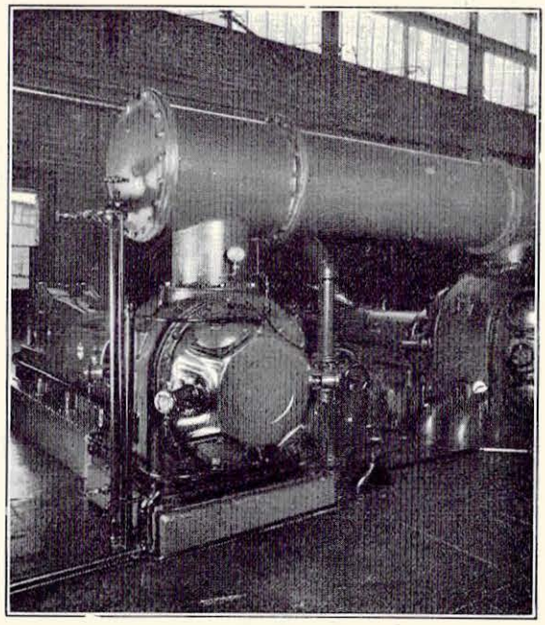


More Diesel engines are lubricated with Gargoyle D. T. E. Oils than with any other brand of oil.



Gargoyle Cylinder Oil 600-W lubricates more reciprocating steam engines than any other brand of oil.

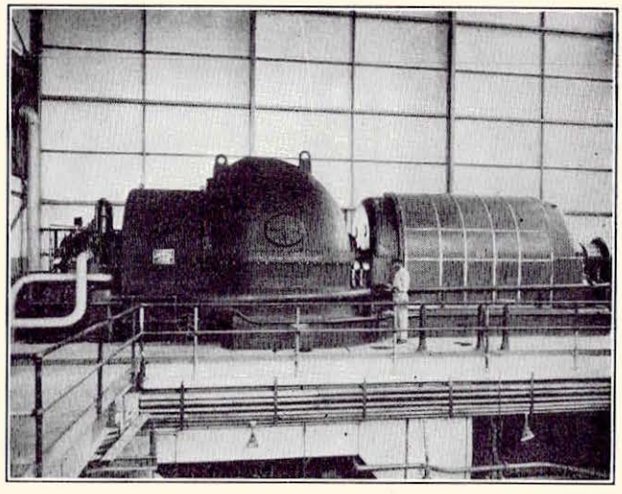
prefers lubricants



Manufacturers and users of air compressors have found that Gargoyle D. T. E. Oils cut oil and repair costs, reduce idle time for maintenance work, minimize depreciation, avoid accidents and breakdowns.

cost, with less time and expense for repairs, and less depreciation of the prime mover. Chief engineers of railroad power plants are insisting, regardless of the lubrication policy of other departments of their road, that only the best lubrication is good enough for expensive power equipment.

If you are not yet using Gargoyle lubricants, ask the Vacuum representative to give you some of their actual performance records on your type of equipment. Gargoyle lubricants and Vacuum engineering counsel will also help *you* lower power costs.



More electrical energy is produced by machines lubricated with Gargoyle lubricants than with any other brand.

GARGOYLE OIL

Railroad Lubricants

The world's quality oils and greases
for railroad lubrication

VACUUM OIL COMPANY

Railroad Department · *Headquarters:* 61 Broadway, New York · Branches and distributing warehouses throughout the world

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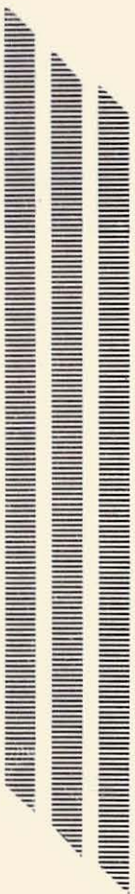
Of the 324 leading American builders of engines and heavy machinery, 262 use Gargoyle lubricants for important machinery in their own plants

Motive Power Preparedness Will Give Greater Earnings



WITH constant demands for greater speed, increased tonnage and improved service to shippers, a number of railroads are planning to purchase locomotives which will adequately meet the needs of commerce and industry and also guarantee increased earnings.

While the past twenty-five years have witnessed many notable improvements in locomotive design, not more than one-fifth of all the power in use today can be termed strictly modern.

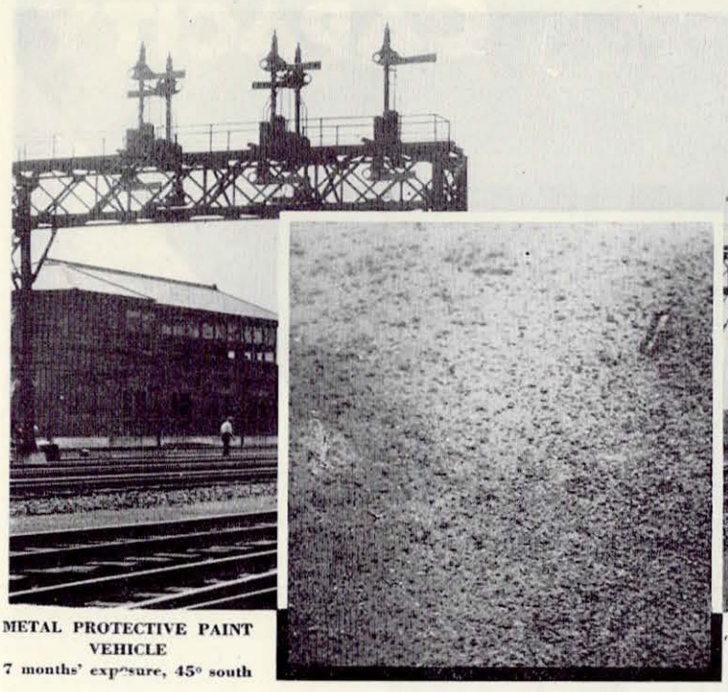
With our most complete manufacturing facilities and thorough study of today's needs, we are prepared as never before to design and build locomotives which will meet the most exacting traffic demands and insure lower operating and maintenance costs.

We invite the opportunity to demonstrate the correctness of these statements.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

Du Pont DULUX
cuts upkeep costs on all equipment



METAL PROTECTIVE PAINT VEHICLE
7 months' exposure, 45° south

DULUX VEHICLE—19 months' exposure 45° south

More than 175% longer life for Dulux! The 45° southern exposure is twice as severe as ordinary exposure. To insure shorter and more accurate tests, each of these steel panels was given a single coat of the clear vehicle without rust-inhibitive pigments.

Field-tested over three-year period.* DULUX *has proved its ability to retain color, gloss, and protective film at least* 50% to 100% longer *than paints, varnishes and enamels

An amazing chemical development ... the greatest since DUCO

THERE is hardly a surface on the road on which you cannot cut your maintenance cost with an entirely new type of finish—Dulux. Bridges . . . towers . . . structural steel . . . stations . . . rolling stock, all property can be improved in appearance, protected more completely, yet refinished less frequently. Signs will be more attractive, semaphores more visible, with Dulux.

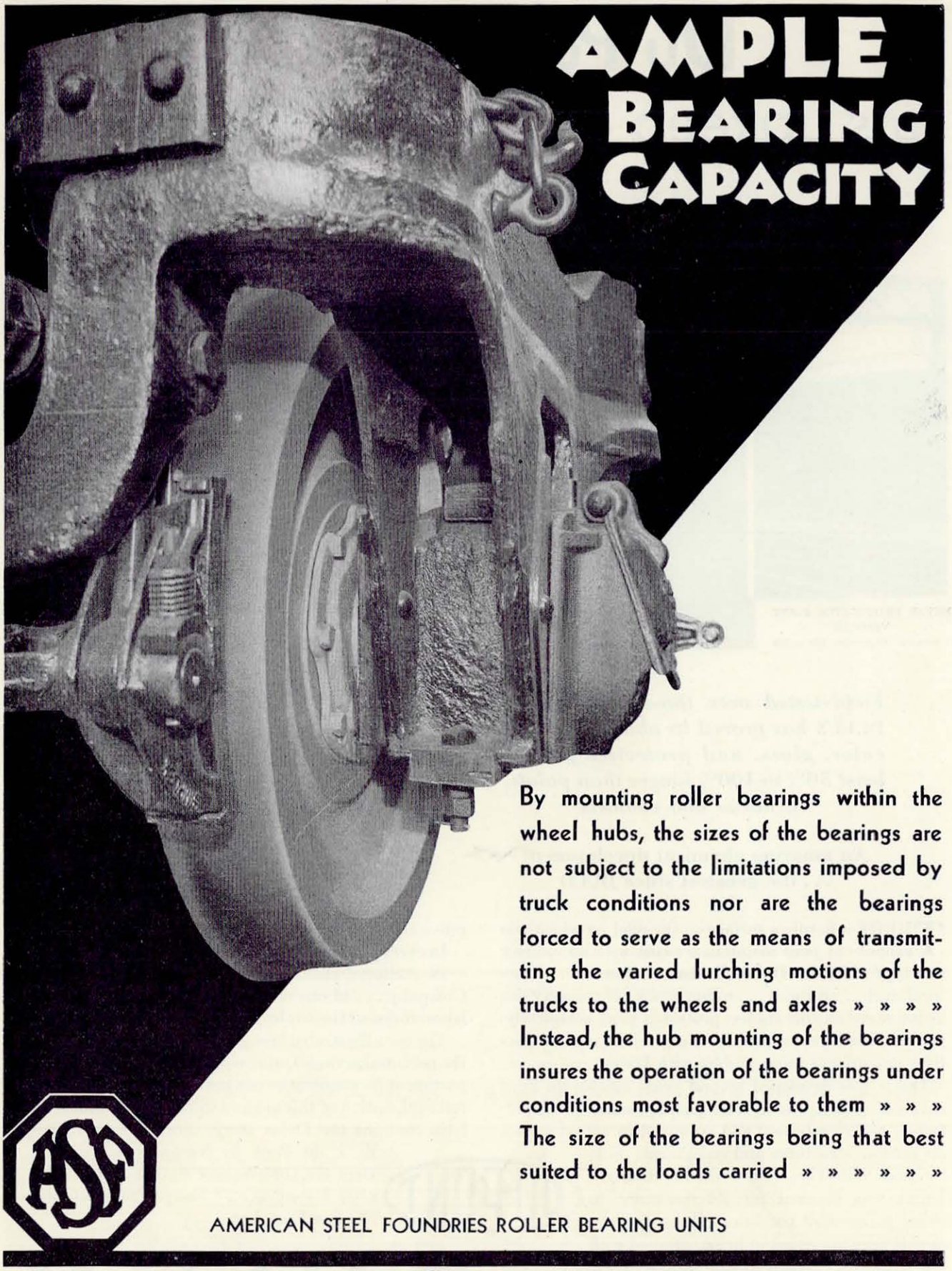
Dulux was developed several years ago by du Pont chemists. But it was secretly guarded until it was perfected, tested, retested, and approved in actual service on railway structures and equipment. Side by side with the best orthodox finishes, Dulux was checked for its resistance to every conceivable condition. Dulux-finished metals were immersed in brine, sprayed with salt solutions, exposed to sun, rain, heat, cold, and sulphur fumes. In every case, results showed that the life of Dulux is at least 50% to 100% longer than the present oil and varnish types of finish. They showed that its retention of color and gloss is also greater by 50% to 100%.

In every property DULUX is a distinctive type of finish—an exclusive chemical development of the du Pont Company . . . of one of the finest research and control laboratories in the world.

The tests illustrated here give you at least a glimpse of the potential savings Dulux represents. But the true proportion of its possibilities can be obtained only through a full explanation of this modern miracle. A technical bulletin contains the Dulux story. For your copy, write E. I. du Pont de Nemours & Co., Inc., Dept. R2, 1616 Walnut St., Philadelphia, Pa.; 2100 Elston Ave., Chicago; 351 California St., San Francisco.

DU PONT
REG. U. S. PAT. OFF.

DULUX



AMPLE BEARING CAPACITY

By mounting roller bearings within the wheel hubs, the sizes of the bearings are not subject to the limitations imposed by truck conditions nor are the bearings forced to serve as the means of transmitting the varied lurching motions of the trucks to the wheels and axles » » » »
Instead, the hub mounting of the bearings insures the operation of the bearings under conditions most favorable to them » » »
The size of the bearings being that best suited to the loads carried » » » » » »

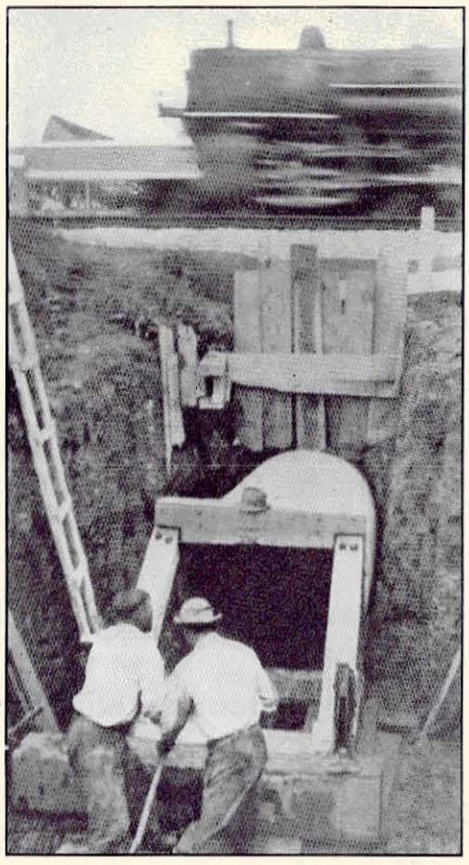
AMERICAN STEEL FOUNDRIES ROLLER BEARING UNITS

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

ARMCO JACKING

means a new measure of safety . . . . at Low Cost



Installing Armco Corrugated Iron Pipe by the Armco Jacking Method under a railroad in Ohio.

THE ARMCO development of the jacking method for placing culverts is the result of years of engineering research and study. Armco engineers saw the need for a new method of placing pipe under existing track which would combine safety with speed and economy. They perfected a plan which reduces installation costs 25% to 50% while traffic keeps moving normally and without decrease of safety. The right of way is always clear.

But Armco engineers were concerned with future as well as immediate safety and economy. Armco jacking, scientifically engineered, protects the tracks against sagging during the operation and through the future years. There can be no settlement because the roadbed is not cut. Using Armco Corrugated Iron Pipe gives assurance of continued strength and durability.

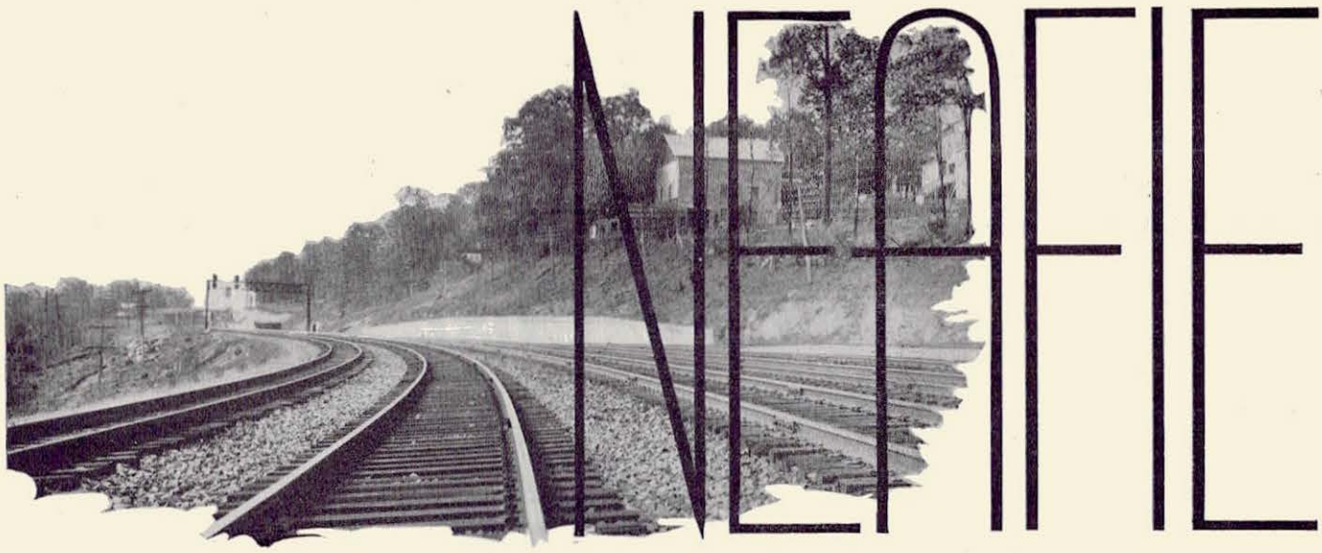
Many railroads and public service companies have adopted the Armco Jacking Method. Data on its success in use and its low cost and convenience, will be mailed to any address on request.

Armco culverts and drains are manufactured from the Armco Ingot Iron of the American Rolling Mill Company and always bear its brand.

ARMCO CULVERT MANUFACTURERS ASSOCIATION — *Middletown, Ohio*

ARMCO *Jacking Method*

C. 1931 ACMA



A Proved American Track Construction

IN these days of heavy traffic and high speeds, maintenance costs are more than ever an item of serious consideration.

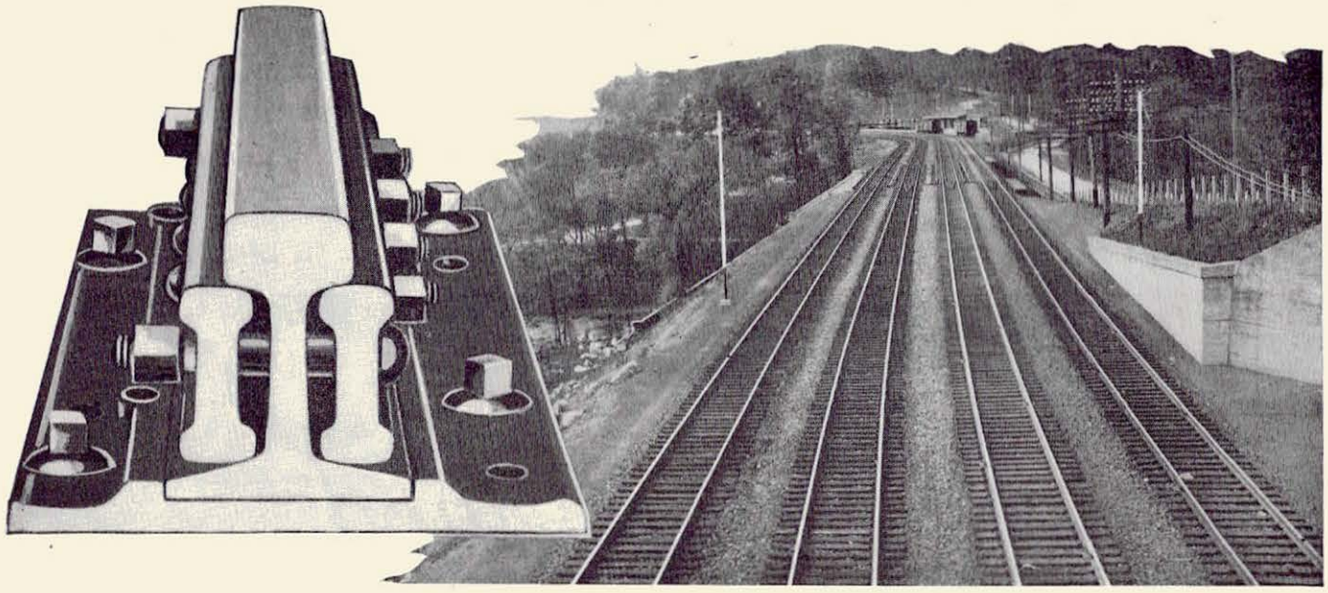
The Neafie Rail Joint with its heavy broad base plate constitutes a great stride toward permanent track construction and therefore an active agency of economy and at nominal cost.

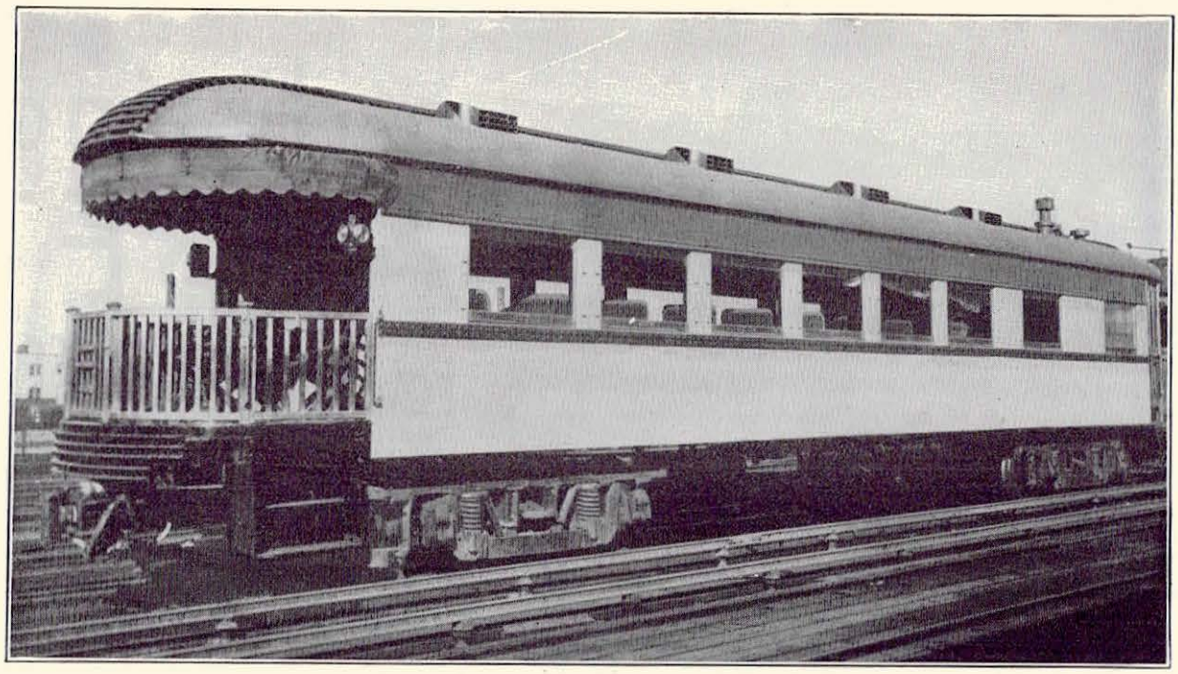
In addition to its characteristics of permanence, it is a tie saver and a labor saver.

These facts have been demonstrated over the past eight years.

THE RAIL JOINT COMPANY

165 Broadway—New York





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A R M C O

RAILROAD PRODUCTS

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Car Siding

Locomotive Jacket Sheets

Passenger Car Sheets and Plates

Freight Car Sheets and Plates

Galvanized Ingot Iron and Steel Sheets

Blue Annealed Ingot Iron and Steel Sheets

...and they always look the part

THERE they go—just out of the shops—trim, attractive passenger train cars, with sheer, gleaming sides and roofing formed from Armco Sheets.

Thousands will see them and admire them, even as you do. These inviting cars are more than mere conveyances: they are friendly ambassadors of good will for your road. Then, too, there are substantial savings in fabrication when you use Armco car siding and roofing. The sheets work easily, form surely, and finish quickly and faultlessly.

Before you again choose sheets for passenger train car roofing and siding, see an Armco Engineer. He knows intimately the sheet and plate requirements of exacting railroad buyers, and can help you obtain an adequate return from your investment. Just write to the nearest office.

ARMCO RAILROAD SALES CO.

Executive Offices, Middletown, O.

Subsidiary of The American Rolling Mill Company

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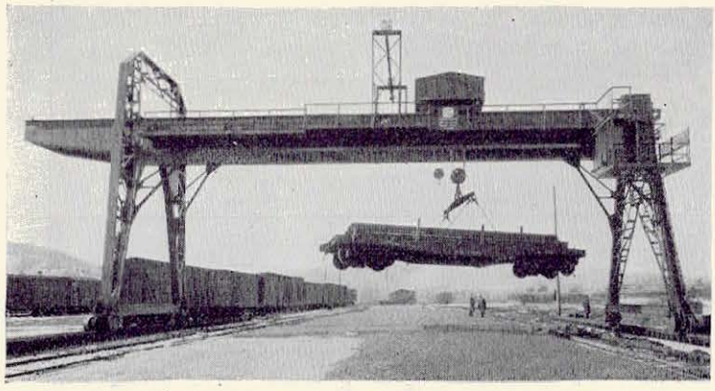
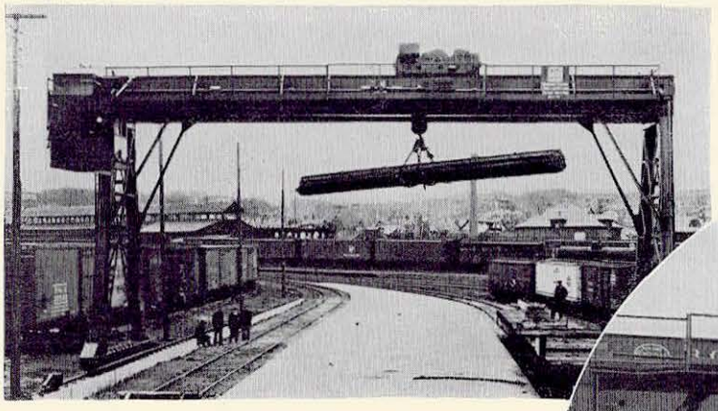
ARMCO

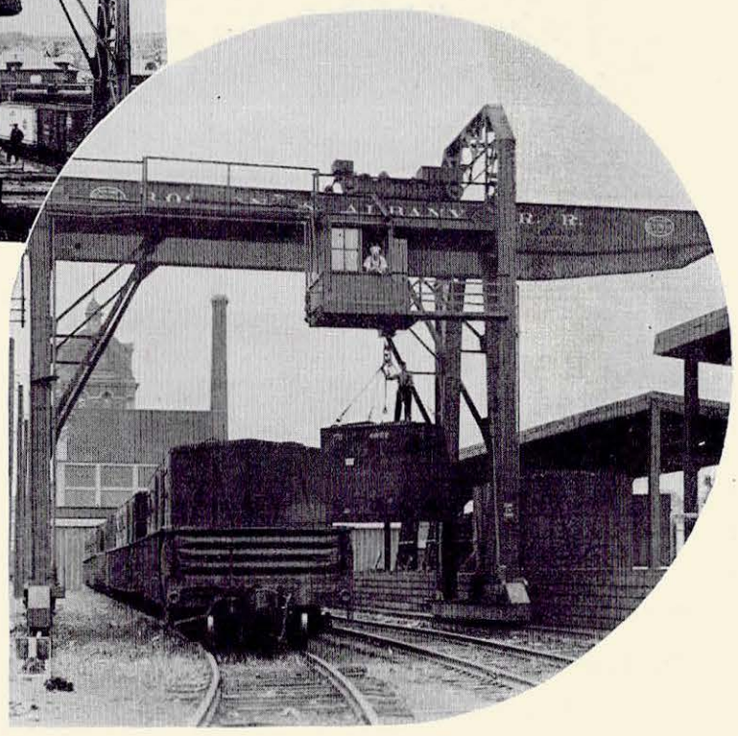
SPECIALLY PROCESSED

ARMCO IRON AND STEEL SHEETS

FOR EXACTING PURPOSES







a distinct ASSET to the Traffic department

Upper—50-ton "Milwaukee" Gantry Crane in service on a large Eastern Trunk line.
Lower—"Milwaukee" 20-ton Gantry Crane, with 5-ton auxiliary, handling rail.
Side — Single Cantilever 10-ton "Milwaukee" handling freight containers.

MANY railroads have found that "Milwaukee" Gantry Cranes enable them to guarantee speedier delivery to their shippers. This is equally true . . . where the freight is shipped in gondola cars or in containers—and the container method is rapidly coming into general use.

Fast lifting speed . . . safety . . . and dependability . . . are assured by P & H, world's largest builder of cranes and hoists.

During 1930, "Milwaukee" placed more gantry cranes in service than any other manufacturer.

In the railroad field, "Milwaukee" users include the Northwestern . . . the Long Island . . . Central Railroad of New Jersey . . . Burlington . . . Santa Fe . . . Atlantic Coast Line . . . Boston and Albany . . . Southern Pacific . . . the Milwaukee Road . . . N. Y. N. H. & H. . . . Baltimore and Ohio . . . Lehigh Valley . . . and Grand Trunk.

The world's largest staff of crane engineers is at your service. It pays to consult "Milwaukee" . . . first, last and always.

Milwaukee Electric Crane & Hoist Division of

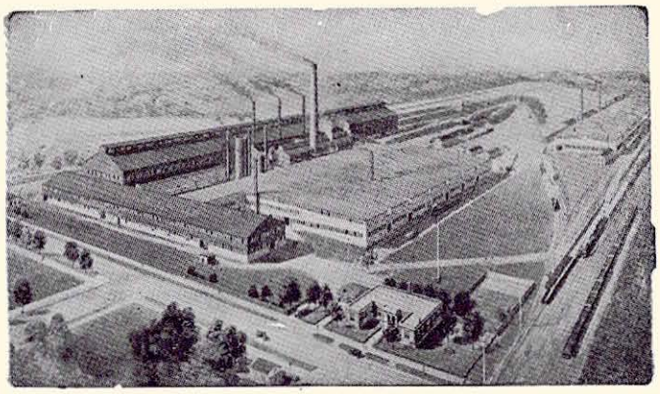
HARNISCHFEGER CORPORATION

4429 W. National Avenue Milwaukee, Wisconsin

Traveling Cranes up to 300 Tons . . . . Low Headroom Cranes 3 to 30 Tons . . . . Single I-Beam Cranes 1/4 to 5 Tons . . . . Monorail Hoists (all types) 1/4 to 10 Tons . . . . Lumber Cranes . . . . Bucket Cranes . . . Corduroy-Crawler Cranes . . . Gantry Cranes . . . Single Line Buckets.

HOISTS MILWAUKEE CRANES ROLLER BEARING CRANES

MILWAUKEE



Chicago Heights Plant

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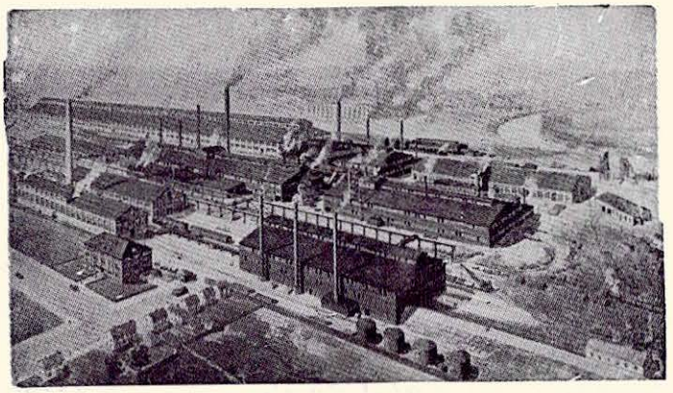


Latrobe Plant

LATROBE AND CHICAGO HEIGHTS SPRING PLANTS

THOUGH separate units, the same high quality of method and equipment is maintained in all of the Railway Steel-Spring Company Plants. They are operated under central control to insure full maintenance of that high quality.

Whether the Springs for locomotives, passenger or freight cars come from the French Works, Latrobe Pa., Chicago Works, Chicago Heights, Ill., or the St. Louis Works, East St. Louis, Ill., they will be of the same high quality and perfection of manufacture. All will be interchangeable in dimensions, and have that ability to stand up under the most severe strain.

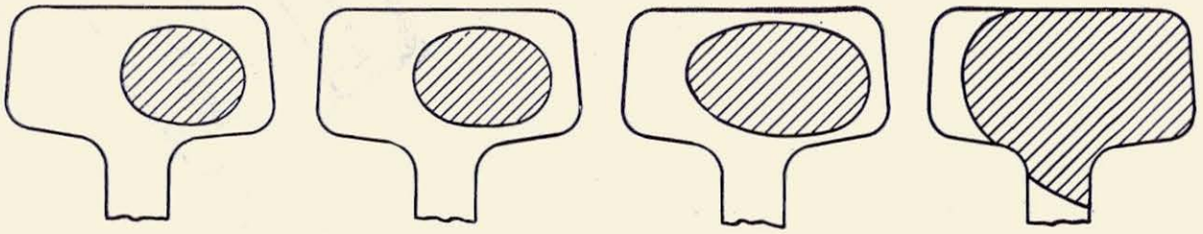
Railway Steel-Spring Company

30 CHURCH ST., NEW YORK

Branch Offices:

Chicago, Ill. — St. Paul, Minn. — Detroit, Mich. — Dallas, Texas. — Richmond, Va. — St. Louis, Mo. — Cleveland, Ohio — Pittsburgh, Pa. — Denver, Colo. — Montreal, Que. — San Francisco, Cal.

STOP FISSURE GROWTH...*in the early stages by systematic* RAIL TESTING



1. Fissure found in track 31% of rail head
2. One month later 35%
3. Two months later 50% area
4. Three months later rail broke in track 80% area

Below is an interesting record of relatively new rail found defective by a Sperry Detector Car. These rails had only been in track five months. Note particularly the large number of rails with several fissures per rail. The removal of these dangerous rails alone makes the Sperry test worth while.

NEW RAIL—
5 Months in Track

Number of Fissures per Rail	Number of Rails
1	21
2	4
3	2
4 or more	7

Write for a copy of Bulletin No. 57 giving interesting data about Sperry Rail Service.

THE above record, taken from one of many cases, is an interesting example of how fissures grow in track.

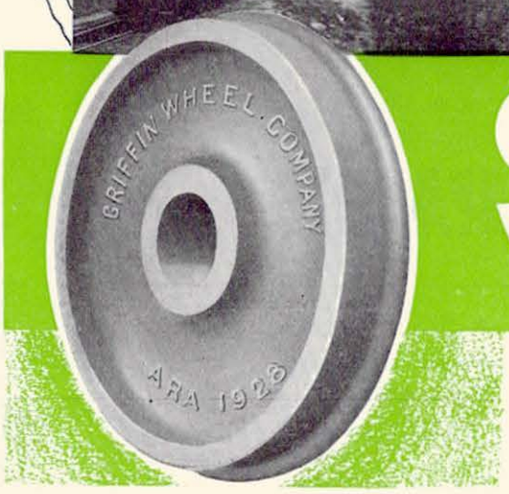
■ This fissure was detected by a Sperry Detector Car, and after taking the necessary precautions, the rail was watched and tested by accurate measuring instruments to record future growth. The rail sections above tell how the size increased at various stages, finally resulting in fracture after 3 months of additional service.

■ Sperry tests and rail failure data have established the fact that fissures grow in track. Today's heavy axle loads and high train speeds are known to influence this growth. New rails, as well as old, are found during Sperry tests with their strength weakened by growing fissures.

■ By using Sperry Rail Service to test rails periodically, these fissures can be accurately located before they grow to a dangerous size. The removal of these defective rails improves track conditions and promotes a higher degree of safety than is otherwise possible.

SPERRY RAIL SERVICE

SPERRY PRODUCTS, INC.
Sperry Building, Manhattan Bridge Plaza, Brooklyn, N. Y.
Chicago Office: 80 East Jackson Blvd.



GRIFFIN WHEELS

Practically 98% of all Refrigerator Cars are equipped with Chilled Tread Wheels, of which 75% are GRIFFIN

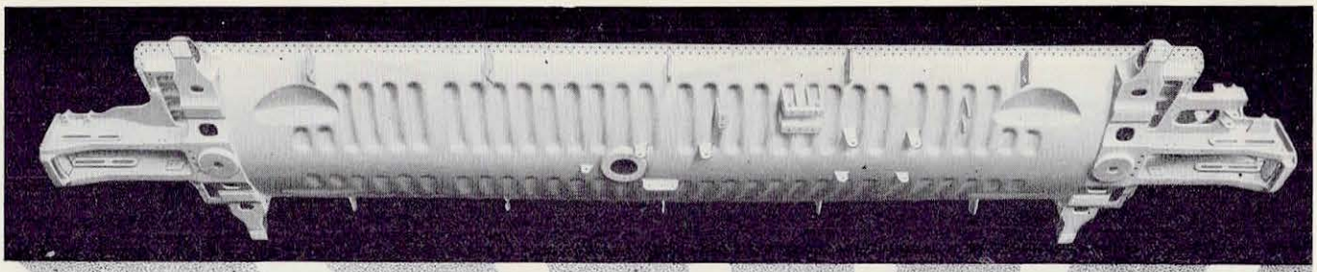
Griffin Plants Conveniently Located

Chicago	Detroit
Cleveland	Cincinnati
Boston	St. Paul
Kansas City	Tacoma
Council Bluffs	Denver
Los Angeles	Salt Lake City

THE FOOD SUPPLY OF THE NATION IS CARRIED ON CHILLED TREAD WHEELS

Griffin Single Plate Wheels, because of their unusually high compressive strength and resistance to heat stresses, are especially well adapted for service under 70-ton cars. Griffin Wheels are dependable, long-lived and economical under all railroad freight equipment.

GRIFFIN WHEEL COMPANY
410 N. Michigan Ave.,
Chicago, Ill.



ONE PIECE CAST STEEL UNDERFRAME, *Bottom View*

Commonwealth CAST STEEL TANK CAR UNDERFRAME

Combines in A Single Steel Casting the Bottom Portion of the Tank, Center Sills, Body Bolsters, Draft Gear Pockets, Striking Castings, and Brake Cylinder Supports.

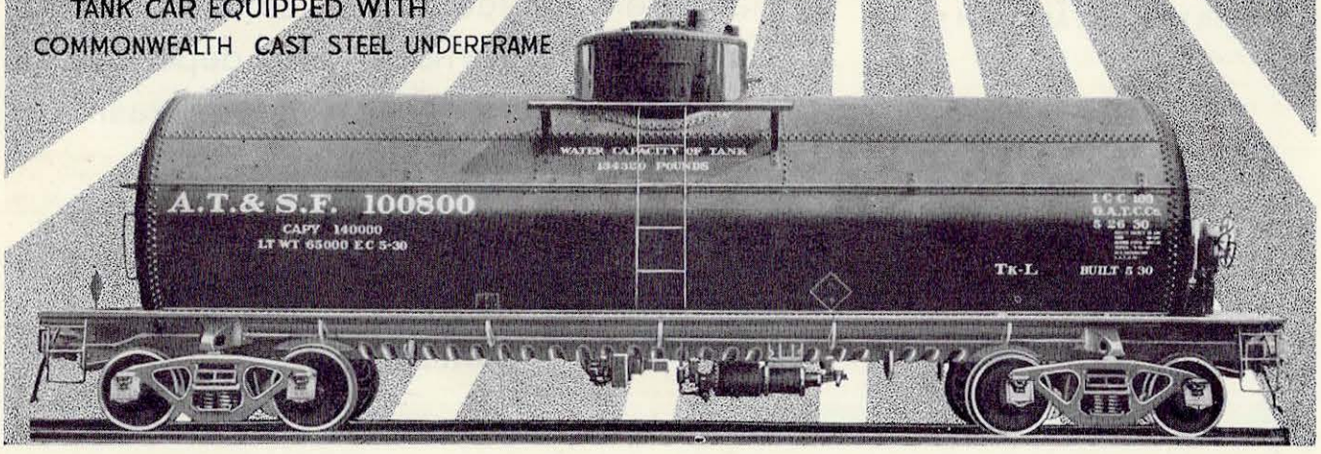
Increased Strength and Capacity, Lower Center of Gravity and Reduced Maintenance are Important Features of this Type of Underframe.

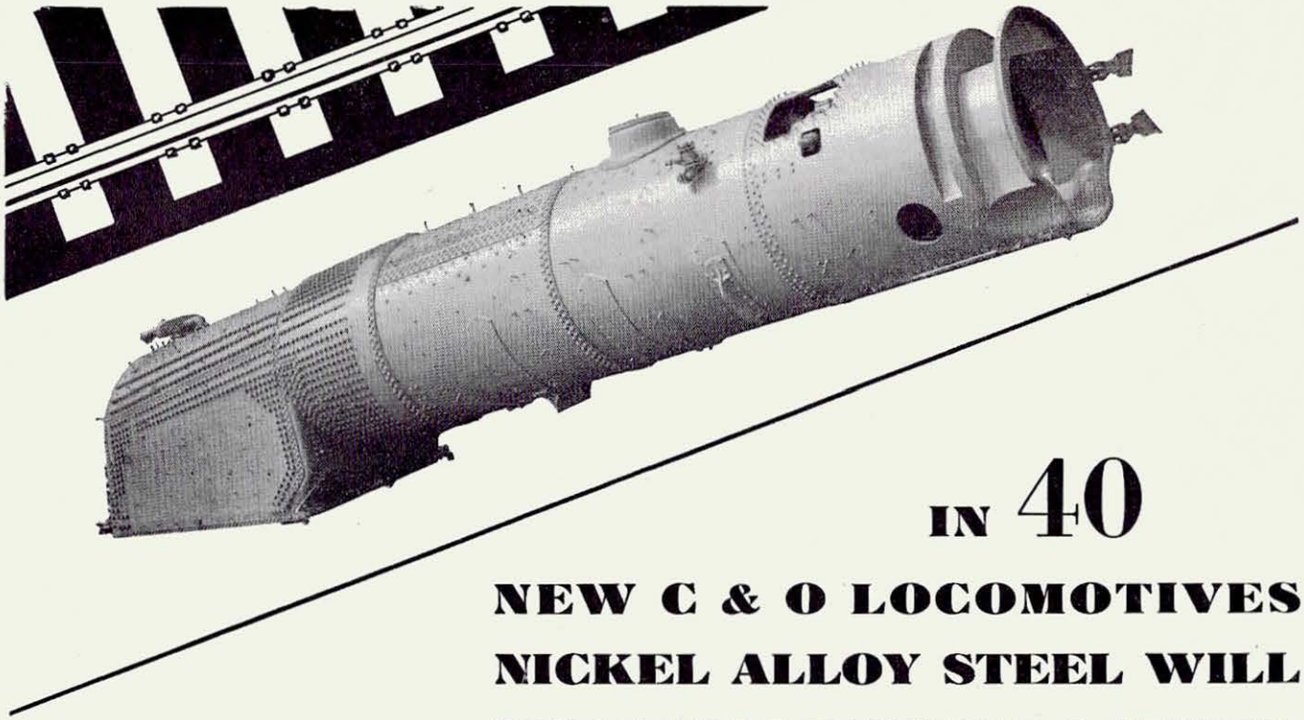
This large capacity tank car with One-Piece Cast Steel Underframe is typical of the way in which Commonwealth Cast Steel Underframes are used to advantage in the construction of all types of freight cars.

GENERAL STEEL CASTINGS CORP.

GRANITE CITY, ILL. *EDDYSTONE, PENN.*

16,000 GAL. CAPACITY
TANK CAR EQUIPPED WITH
COMMONWEALTH CAST STEEL UNDERFRAME





IN 40 NEW C & O LOCOMOTIVES NICKEL ALLOY STEEL WILL PERFORM BETTER LONGER

Nickel Alloy Steel boiler for C & O locomotive built by LIMA LOCOMOTIVE WORKS, INC., Lima, Ohio. Boiler plate furnished by OTIS STEEL CO., Cleveland, Ohio.

The most powerful 2-cylinder engines ever built were recently completed by the Lima Locomotive Works for the C & O.

To secure maximum strength with minimum weight, and to obtain toughness and shock resistance, the main frames, guide yoke crossties and crossheads are made of 2% low carbon Nickel Steel castings furnished by Ohio Steel Foundry Co.

The boiler shell courses of low carbon Nickel Steel will stand higher pressures with a reduction in plate thickness, which allows a saving in weight over ordinary boiler steel.

Builders of locomotives that meet present day transportation requirements realize that Nickel Alloy Steel "performs better longer" in railway service, just as it does in all other industries where dependable strength is demanded.

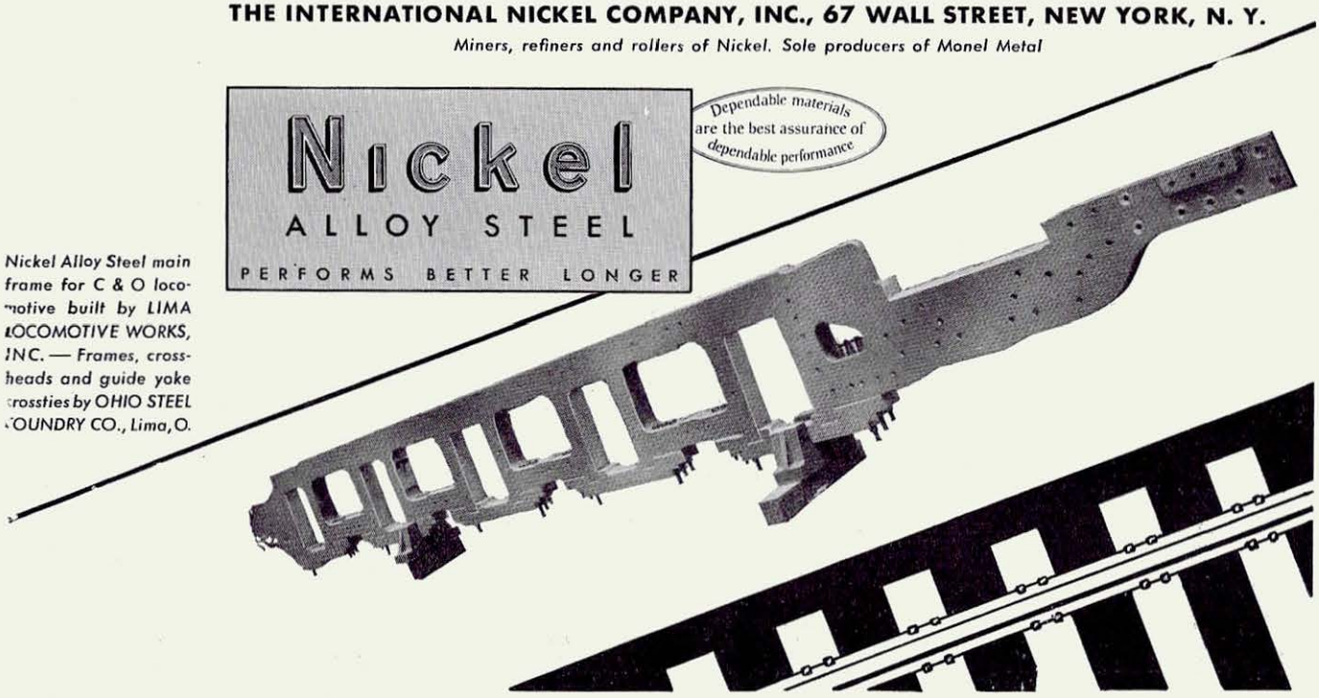
Send for booklet "Alloy Steels in the Railroad Field".

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

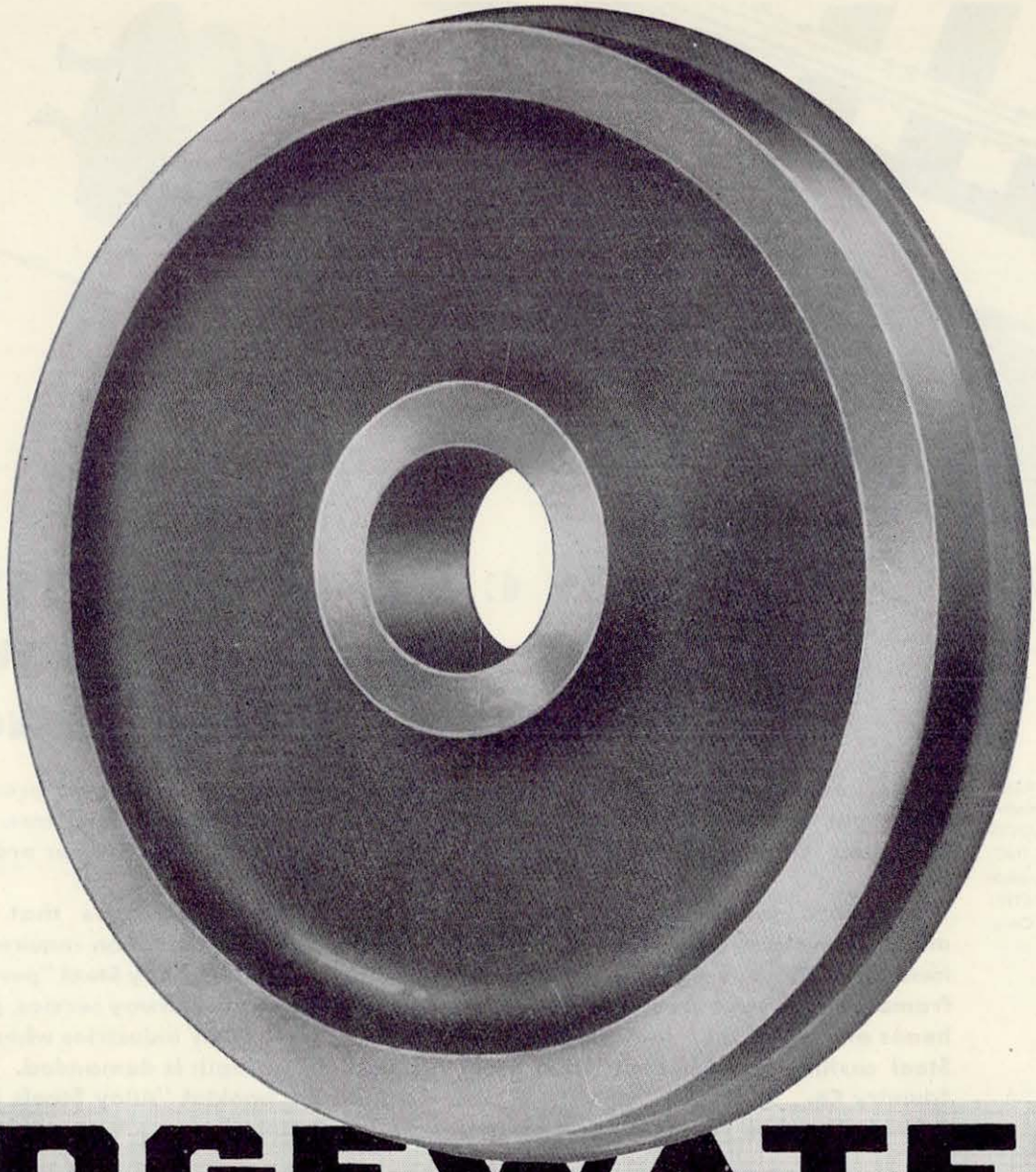
Miners, refiners and rollers of Nickel. Sole producers of Monel Metal

Nickel
ALLOY STEEL
PERFORMS BETTER LONGER

Dependable materials are the best assurance of dependable performance



Nickel Alloy Steel main frame for C & O locomotive built by LIMA LOCOMOTIVE WORKS, INC. — Frames, crossheads and guide yoke crossties by OHIO STEEL FOUNDRY CO., Lima, O.



EDGEWATER

ROLLED STEEL WHEELS

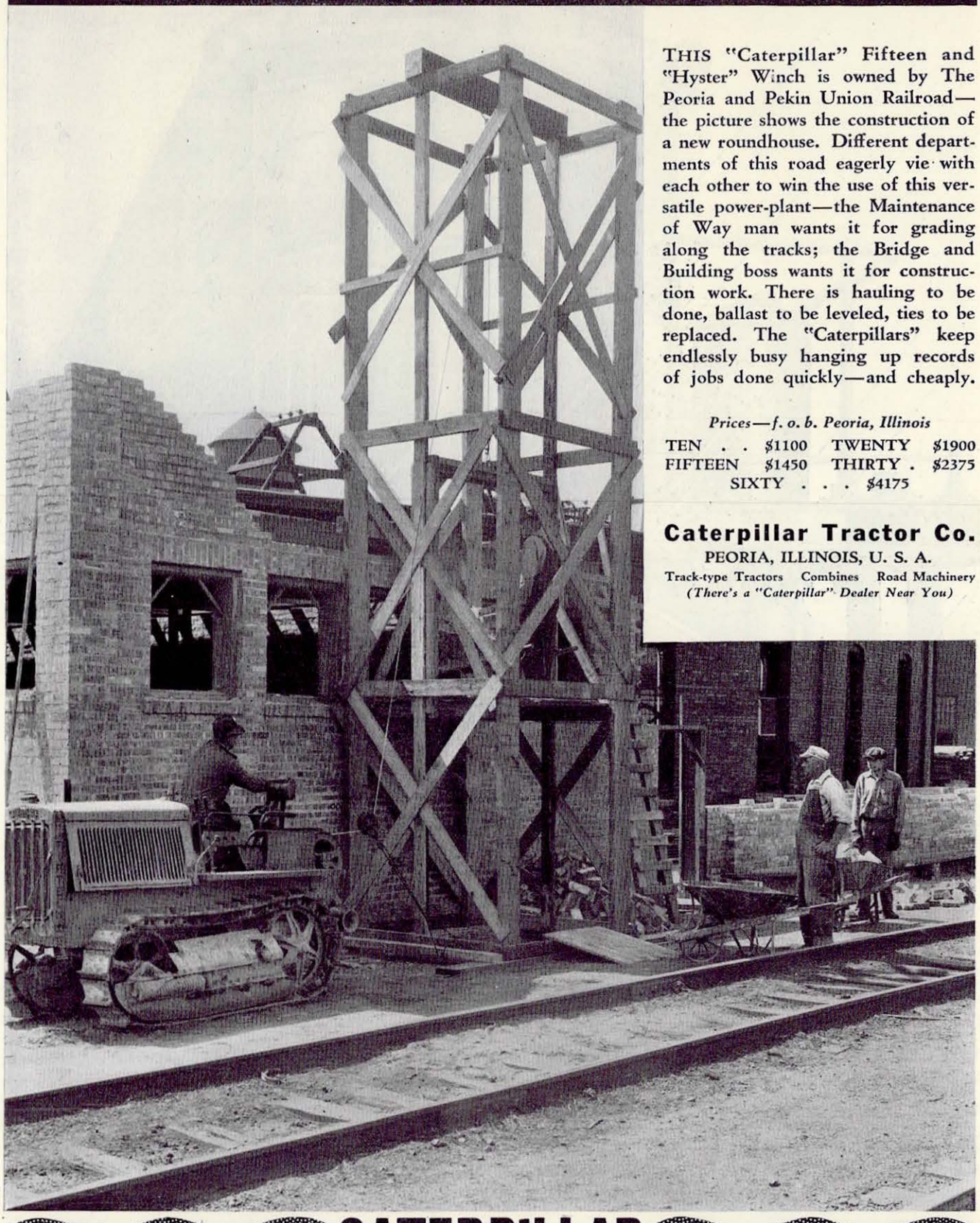
LOCOMOTIVE & CAR WHEEL TIRES

EDGEWATER STEEL COMPANY · PITTSBURGH, PENNA.

SALES OFFICES

Atlanta, Ga. Baltimore, Md. Boston, Mass. Chicago, Ill. Louisville, Ky. Philadelphia, Pa. Portland, Ore. San Francisco, Cal.
St. Louis, Mo. St. Paul, Minn. Seattle, Wash. Washington, D. C. New York, N. Y.

WHO'LL GET THE "CATERPILLAR"?



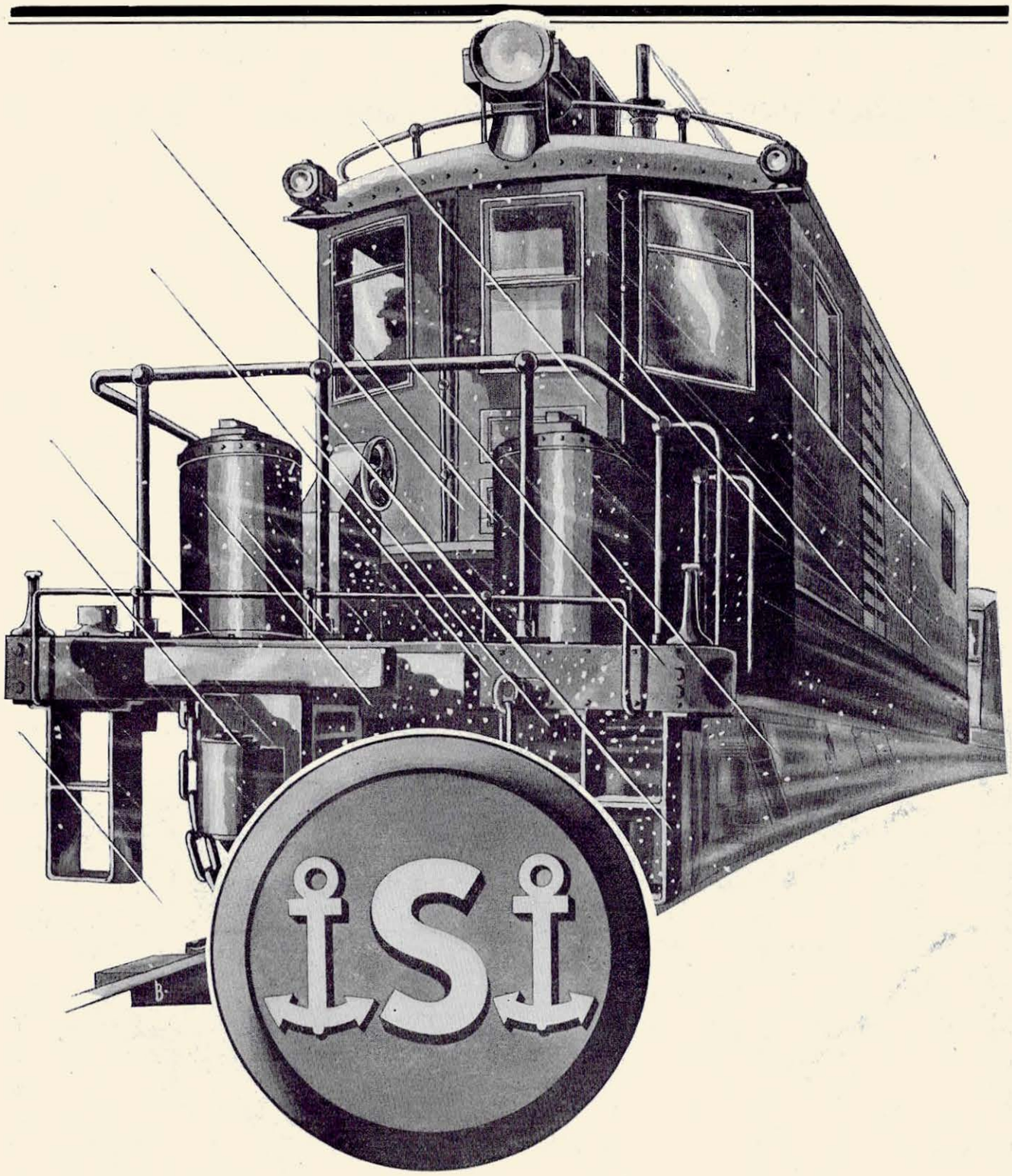
THIS "Caterpillar" Fifteen and "Hyster" Winch is owned by The Peoria and Pekin Union Railroad—the picture shows the construction of a new roundhouse. Different departments of this road eagerly vie with each other to win the use of this versatile power-plant—the Maintenance of Way man wants it for grading along the tracks; the Bridge and Building boss wants it for construction work. There is hauling to be done, ballast to be leveled, ties to be replaced. The "Caterpillars" keep endlessly busy hanging up records of jobs done quickly—and cheaply.

Prices—f. o. b. Peoria, Illinois

TEN . .	$1100	TWENTY	$1900
FIFTEEN	$1450	THIRTY .	$2375
SIXTY . . .	$4175		

Caterpillar Tractor Co.
PEORIA, ILLINOIS, U. S. A.
Track-type Tractors Combines Road Machinery
(There's a "Caterpillar" Dealer Near You)

CATERPILLAR
REG. U. S. PAT. OFF.



On electric locomotives, "Standard" wheels, tires and axles are living up to the name created and proved over years of satisfactory operation on steam locomotives.

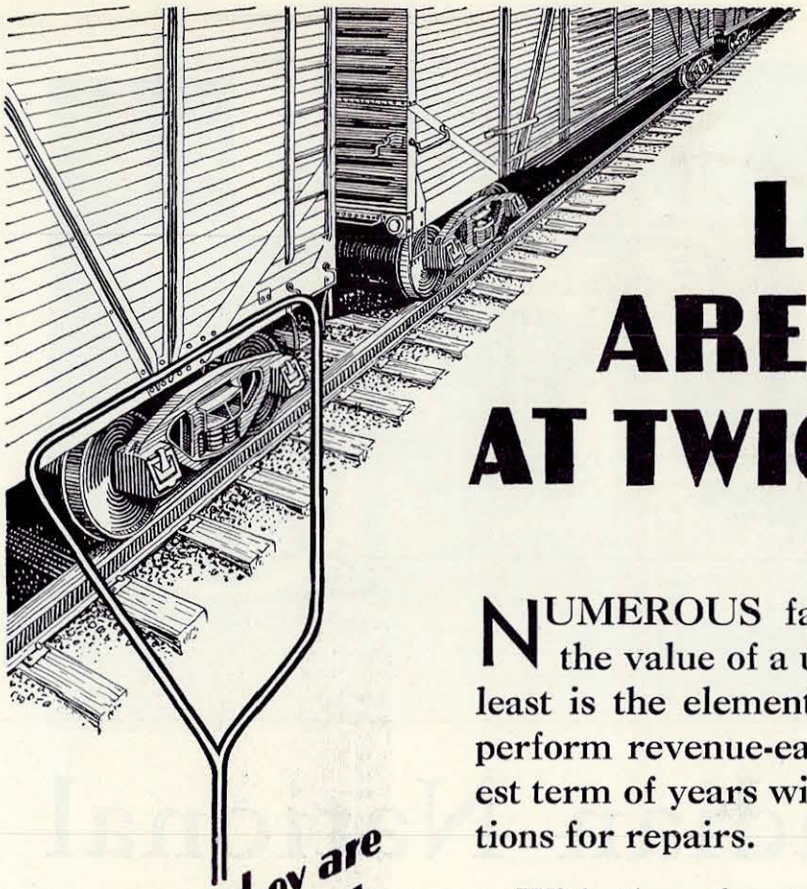
STANDARD STEEL WORKS COMPANY

GENERAL OFFICES & WORKS: BURNHAM, PA.

CHICAGO
NEW YORK
PHILADELPHIA

ST. LOUIS
RICHMOND

AKRON
PORTLAND
SAN FRANCISCO

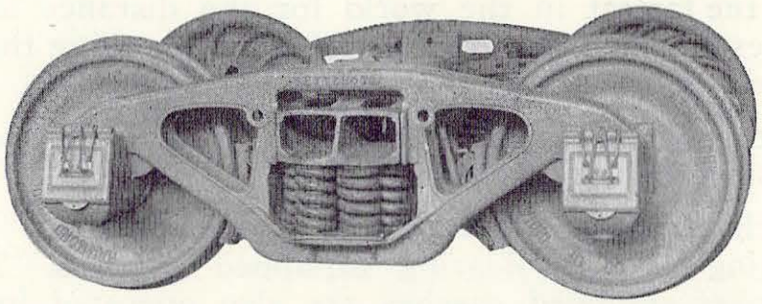


CARS LIKE THESE ARE YOUNGER AT TWICE THE AGE

NUMEROUS factors combine to establish the value of a unit of rolling stock. Not the least is the element of long life—the ability to perform revenue-earning service over the longest term of years with the minimum of interruptions for repairs.

With the advent of the Bettendorf Dalman-Type Truck the normal earning life of rolling stock has appreciably lengthened. No more destructive, joint-loosening, material-fatiguing road shocks through the medium of solid or broken springs. Instead, the Bettendorf Dalman-Type has ushered in an era of easy riding, spring cushioned freight haulage. The best of the modern freight cars are so equipped.

Because they are equipped with BETTENDORF Dalman-Type Trucks



The Dalman feature adds two standard coils to each spring group.

THE BETTENDORF COMPANY

OFFICES AND WORKS BETTENDORF, IOWA

New Canadian National Giants have Timken-Equipped Tenders

Photograph shows one of three new locomotives recently placed in service by the Canadian National Railways, to haul the International Limited between Montreal and Chicago.

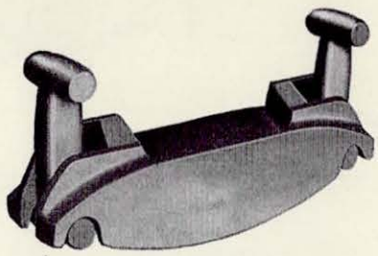
This train operates on a schedule of 18 hours 5 minutes between Montreal and Chicago, and is said to be the fastest in the world for the distance of 334 miles between Montreal and Toronto, making the run in six hours.

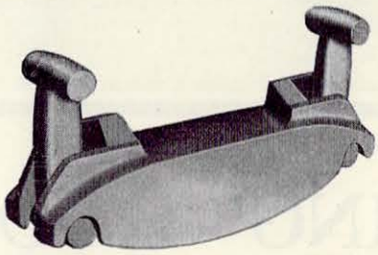
The new engines have 80-inch drivers, and a working boiler pressure of 275 pounds.

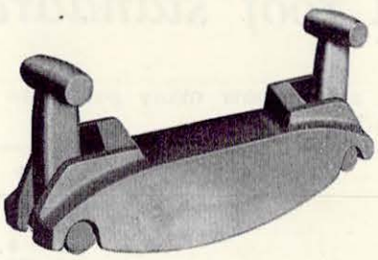
Each tender is mounted on two six-wheel trucks having Timken Bearing Equipped journals. Three Timken-equipped coaches are also operated in this train. The Timken Roller Bearing Co., Canton, Ohio.

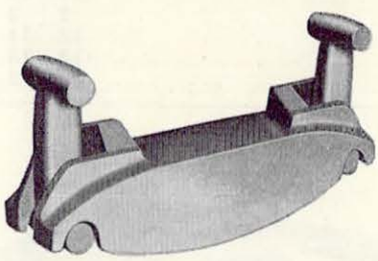
TIMKEN

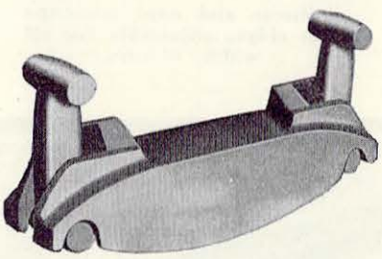
REG. U. S. PAT. OFF.

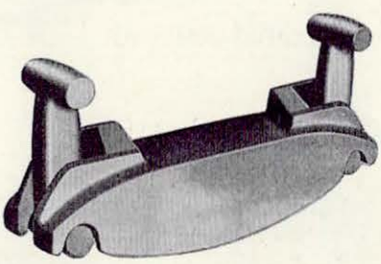


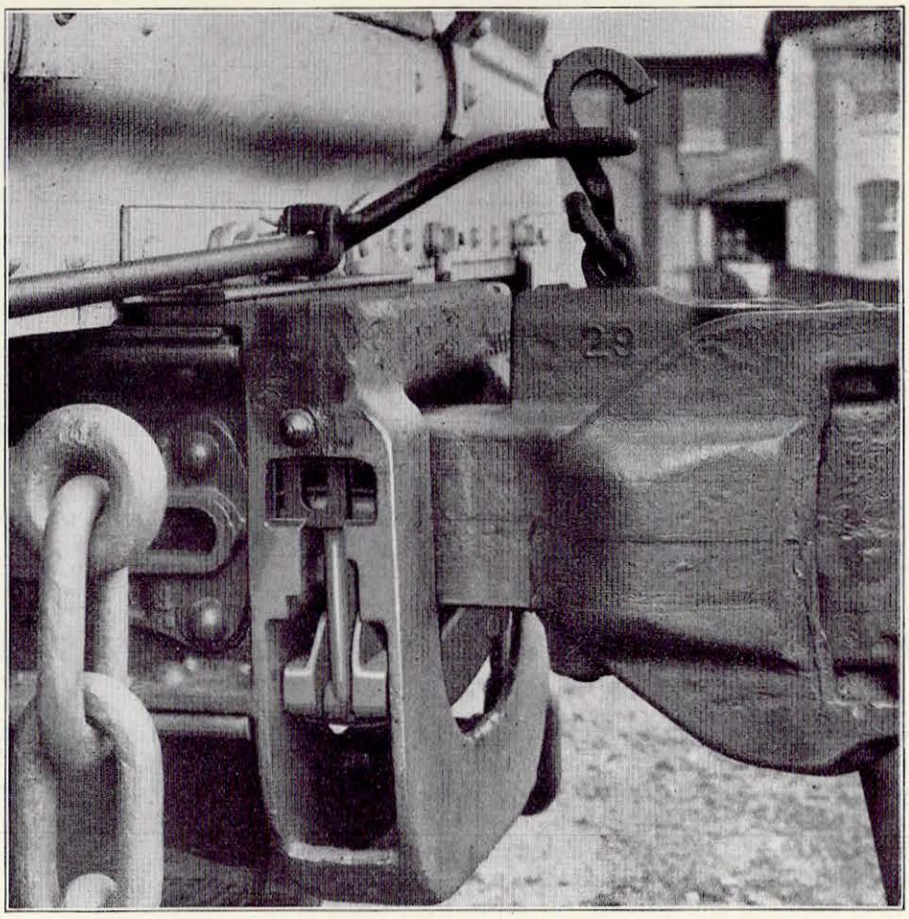












Safety First

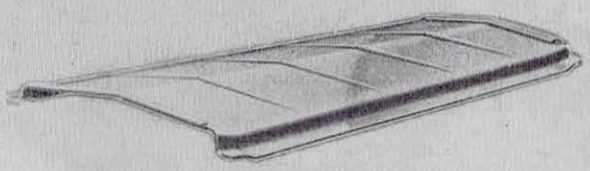
The gravity carry iron of the Union Centering Device returns the coupler to its normal central position. This provides a safety feature well worthy of consideration.

UNION METAL PRODUCTS COMPANY

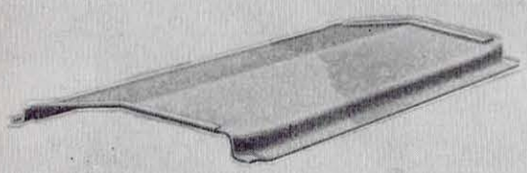
NEW YORK · CHICAGO · ST. LOUIS · WASHINGTON
RICHMOND · HOUSTON · SAN FRANCISCO · KANSAS CITY · MONTREAL

Running board saddle

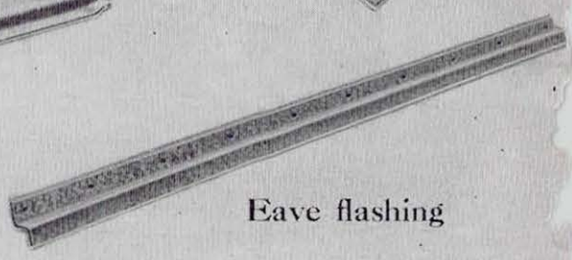
End center cap



Intermediate ridge cap



End ridge cap



Eave flashing

UNIVERSAL DRY LADING ROOF

the one standard roof that fits all roof standards

is capable of saving the railroads millions of dollars annually.

The Universal Dry Lading Roof is so adjustable that it does what it takes thousands of other roofs to do.

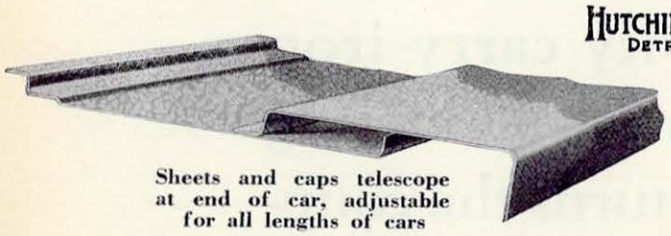
Think what this means in dollars and cents saving. Less capital is tied up in stock parts, less store room space is required and quicker car repairs are made with big savings in labor.

A Universal Dry Lading Roof consists of only 9 parts —each of ***one*** size and ***one*** design. These parts when used in correct combination will roof any width, any length, any type, or any design new or old house car.

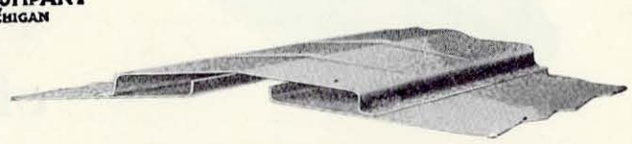
The following table shows how many parts are required for 36′, 40′ and 50′ cars.

Length of Cars	36′	40′	50′
Intermediate sheets	22	24	30
End sheets	4	4	4
Intermediate transverse caps	24	26	32
End transverse caps	4	4	4
Intermediate ridge caps	11	12	15
End ridge caps	2	2	2
Eave flashings	12	14	18
Running board saddles	12	13	16
End center caps	2	2	2

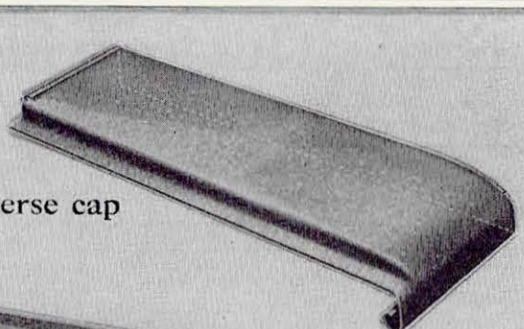
HUTCHINS CAR ROOFING COMPANY
DETROIT MICHIGAN
Established 1880



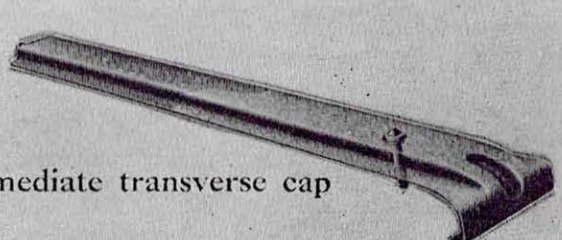
Sheets and caps telescope at end of car, adjustable for all lengths of cars



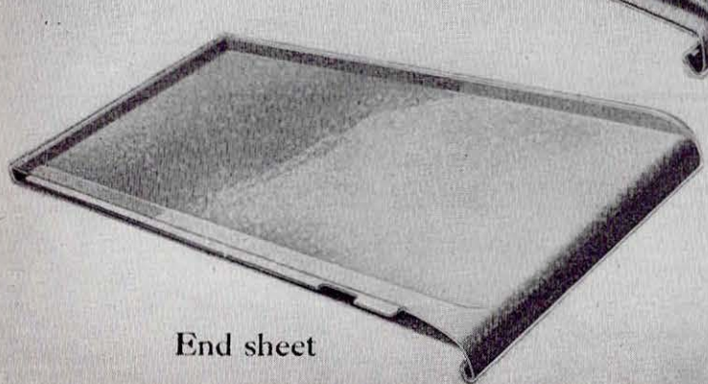
Sheets and caps telescope at ridge, adjustable for all widths of cars



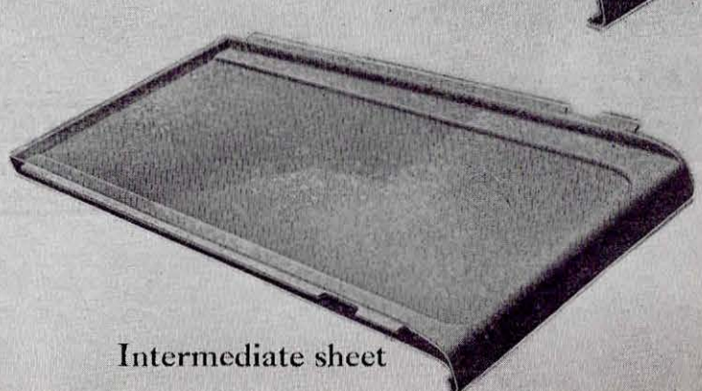
End transverse cap



Intermediate transverse cap



End sheet



Intermediate sheet

Motorists vs. Buses and Trucks

One of the most deliberate and shameful misrepresentations ever disseminated among the American people is the claim being disseminated in the name of the National Automobile Chamber of Commerce that the railways are seeking to increase the taxation and restrict the use of private passenger automobiles and small trucks, such as those owned by farmers. The following statement was made by Pyke Johnson, Washington representative of the National Automobile Chamber of Commerce in a recent radio address: "This traffic, then, which the railroads are trying to restrict, is the movement of more than 26,000,000 private cars, trucks and buses, over the public highway, of which a close estimate shows that the farmers own and operate nearly 5,000,000 passengers cars and almost 800,000 trucks."

The Association of Railway Executives has set forth in a widely distributed pamphlet the changes in the policies of the national and state governments which railway executives ask in order that the railways may be enabled to compete on equal terms with other means of transportation. In that pamphlet there is not a syllable which can be tortured by any honest mind into an intimation that the railways suggest any change whatever in the taxation or regulation of private automobiles or small trucks. Furthermore, no spokesman of the railways has at any time or place made any such suggestion.

As respects the regulation and taxation of motor vehicles, the interests of private motorists and of the operators of large motor buses and trucks are in complete conflict. It is therefore astounding that the National Automobile Chamber of Commerce should allow its name and funds to be used in the dissemination of propaganda which not only grossly misrepresents the attitude of the railways, but opposes taxation and regulation of motor coaches and trucks which would be advantageous to every owner of a private automobile or a small truck.

The Real Railroad Policy

What is the policy actually advocated by the railways with respect to motor vehicles? First, the taxation of motor coaches and trucks in proportion to the expense that their use of the highways costs the public that builds and maintains the highways. Second, "regulation of competing transportation service fairly comparable" with that applied to the railways.

The highways are built and maintained at the expense of the public. This is true regardless of whether the money is raised by general taxation, motor vehicle taxation or gasoline taxation, because, practically speaking, the 24,000,000 owners of private automobiles are the tax-paying public. The railways claim that the operators of large motor coaches and trucks are paying much less in proportion for the use of the highways than are the private motorists. They claim that this is unjust to the private motorist because it results in the private motorist paying a large part of total highway costs that should be borne by the operators of large motor coaches and trucks. They claim it is unfair to the railways because it results in the operators of large motor coaches and trucks being subsidized at the expense of the public in competing with the railways for traffic. Obviously, the private motorist will be benefited, not injured, by any increase in the proportion of total highway costs paid by operators of large motor buses and trucks.

The operators of large motor buses and trucks are subjected to no such regulation of their rates and service as the railways are, although they are competing more and more with the railways for all kinds of traffic. No increase whatever in regulation of private automobiles or small trucks, such as those used by the farmers, has been suggested by the railways. As private motorists practically compose the tax-paying public, they have everything to gain and nothing to lose by such regulation of the operators of large motor buses and trucks as will compel them, as far as regulation can, to compete on terms of equality with the railways, because the handling of traffic by highway which would be handled by rail, under equal treatment of motor common carriers and rail common carriers, congests the highways with large motor buses and trucks, and thereby interferes with and endangers their use by private motorists.

Misrepresentation to the Farmer

One of the most amazing developments in the controversy over the taxation and regulation of large motor buses and trucks has been the enlisting of Chester H. Gray, Washington representative of the American Farm Bureau Federation, as a propagandist for the motor bus and truck interests. In a letter

to Sam H. Thompson, president of the American Farm Bureau Federation, Mr. Gray has virtually charged that the railroad program "strikes at every user of any motor vehicle, and is also supposed to be an effort to make the use of the highways so expensive that the public demand for more highways will lessen." No other class of persons has been so much injured as the farmers by the imposition of excessive taxes, including taxes to subsidize the competition of other means of transportation with the railways; and yet Mr. Gray, seemingly without having read the railroads' "Declaration of Policy," allies himself with those who are trying to prevent the operators of large motor buses and trucks from being compelled to pay adequately for the use of the highways. We believe Mr. Gray is mistaken if he assumes that the farmers are still so prejudiced against the railways that they are willing to continue to pay more taxes than they should be required to pay in order to enable the operators of large buses and trucks to pay less taxes than they should be required to.

Meantime, the spokesmen of the railways should be carefully studying all the propaganda emanating from the motor bus and truck interests and making every effort to refute it and to present fully and accurately to the public, and especially to private motorists, the real program of the railways and the reasons for it. The adoption of this program by state and national governments is in the interests of the railways, but very much more largely in the interest of the public. It will not be adequately presented to the public, however, unless greater efforts to do so shall be made in future than have been made thus far.

A Virgin Field

Within the last three years several railroads have made changes in their track maintenance organizations for the purpose of gaining more effective use of power tools and equipment. Last year one railway laid rail on multiple-track lines under a plan whereby every unit of the work from the distribution of the new material to the picking up of that which was released was carried out during a single interruption of service on the track. Another road effected savings approaching a million dollars in its annual maintenance of way expenditures by the elimination of lost motion and wasteful practices, while on a third railway the scheduling of bridge and building maintenance, under a plan that sets up standard unit costs for each item of work, has resulted in a marked reduction in expenditures.

These departures from conventional methods and schemes of organization represent the initial step in a movement toward the adaptation of quantity production methods to maintenance of way work. Although marked progress has been made in the adoption of power tools and equipment during the last 10 or 15 years, only a beginning has been made in the application of the mass production idea that constitutes the foundation of American industrial success. Naturally, such initial efforts have been beset with many obstacles, chief among which have been a lack of enthusiasm and no little opposition on the part of local supervisory officers. In a word, they have encountered the prejudice born of craft loyalty met in all projects for the mechanization of industry.

However, as these innovations are proving their worth, they are overcoming opposition and are gaining converts on an increasing number of railways. There is, therefore, every reason to believe that we are about to witness a complete recasting of the organizations and methods of conducting maintenance of way and structures operations which will result in a far greater utilization of power tools and equipment than has been possible up to this time.

Coal Trade's Merchandising Plan

The coal industry is beginning to see the necessity of co-operative effort to meet the competition of fuels which move by pipe line. The Committee of Ten—a body which will endeavor to see that the merits of coal are properly exploited and that greater satisfaction is derived from its use—has appointed a managing director and has made plans for opening an office at Chicago at an early date. The committee, which represents coal operators, dealers, stoker manufacturers and allied industries, expects later to establish organizations for the promotion of the use of coal in about 25 population centers.

The coal industry, like the railroads, has for years concentrated its main attention on efficiency of production, and with gratifying results. Meantime, however, just as with the railroads, competition has been growing, so that now the problem of merchandising has become one of pressing importance. The industry, of course, must not neglect continuing to improve the efficiency of its production, but at the same time it cannot afford to overlook the necessity of merchandising its product. The local committees in various centers of population will act as a clearing house for complaints—investigating them and correcting the causes, and, furthermore, will endeavor to publicize the advantages of coal as a fuel.

As one observer has pointed out, one of the disadvantages which coal suffers is that it will burn under almost any conditions, whereas piped fuels generally have the advantage of being used with the very latest and most efficient equipment. Coal, of course, cannot be quite so easily handled with old equipment as can piped fuels with new. On the other hand, any disadvantage it may have may be overcome by the use of modern equipment and proper firing. It

has, moreover, once this disadvantage is overcome, the distinct advantage, in most communities, of great economy. A bulletin recently issued by the National Coal Association tells of tests in apartment house heating in Chicago, comparisons being made between coal stokers and oil burners, showing a saving of 35.7 per cent in favor of coal.

The campaign to publicize the merits of coal is one which most railroad men can aid with the full knowledge that by so doing they are serving themselves. Fortunately, also, it is not necessary for the coal business to overstate its claims. If it accomplishes no more than to secure recognition of its plain merits in situations where it comes into conflict with competitors, it need not fear for its future—nor the railroads for their coal traffic. There are certain territories where gas and oil are more desirable fuels than coal. It would be a mistake to attempt to force coal sales in such communities. But what are the limits of these territories? Nothing should be taken for granted. The protagonists of coal should study the situation in each consuming community and, if it is found that their fuel has obvious advantages, they should make every effort to make these advantages a matter of common knowledge. Railroad men, particularly those in the service of the important coal carriers, should lend full co-operation to the coal industry in its effort to get its case before the public.

Manufacturers and Waterways

In reply to arguments against large government expenditures upon inland waterways, Mississippi valley advocates of this policy claim that their section has been seriously injured by the construction and use of the Panama canal, and that the balance between the Mississippi valley and the Atlantic and Pacific seaboards should be redressed by the improvement of the Mississippi river and its tributaries.

Secretary of War Hurley has supported this view in recent addresses by giving census figures purporting to show that between 1919 and 1927 the number of "manufacturing industries" in Illinois, Iowa, Missouri, Montana, Nebraska, North Dakota, South Dakota, Wisconsin and Minnesota declined from 55,968 to 37,174, or 33.6 per cent. "It is evident," said Secretary Hurley, "that industries are reducing in these sections because of their inability to compete on the west coast and in the markets of Central and South America with industries located along the seashore."

If Mr. Hurley had taken the pains to study more carefully the census tables from which he took the figures he quoted, he would have found they contained other figures indicating that the decline between 1919 and 1927 in the number of manufacturing establishments in all "seashore" states, beginning with Maine on the Atlantic seaboard and going clear around to Washington on the Pacific ocean, was from 172,711 to 118,920, or 31.1 per cent. Surely the Mississippi valley states could not be regarded as having suffered terribly by comparison with the seashore states if the declines in number of manufacturing plants actually were 33.6 per cent and 31.1 per cent, respectively.

The most important fact about all the foregoing figures, however,—both those cited by Secretary Hurley and those cited in reply by the *Railway Age*—is that none of them are of any significance. Statements made by the Bureau of the Census show that its figures for 1919 included those of all factories having products valued at $500 or more annually, while the statistics compiled by it beginning with 1921, and including those published for 1927, include only those establishments having products valued at $5,000 or more annually. This change alone reduced by 21 per cent the number of establishments reported as in existence in the country, and reduced correspondingly the number reported as in existence in each part of the country.

The Bureau of the Census further stated, however, that the elimination of the smaller industries from its reports produced almost no effect upon its total figures regarding numbers of wage earners and aggregate value of manufactured products. What, then, do these figures show? The number of factory wage earners in the mid-western states mentioned by Mr. Hurley declined from 1,372,809 in 1919 to 1,288,256 in 1927, or 6 per cent. The number of factory wage earners in "seashore" states declined from 5,719,930 in 1919 to 5,125,512 in 1927, or more than 10 per cent. The total value of products manufactured in the mid-western states declined from $11,712,292,000 in 1919 to $11,614,700,000 in 1927, or less than 1 per cent, while in the "seashore" states the decline was from $36,308,367,000 to $35,719,833,000, or almost 2 per cent.

And so, according to the very census figures cited by Secretary Hurley and Mississippi valley waterway advocates, the manufacturing industries of the middle western states, without "cheap water transportation" actually held their own better than those of the "seashore" states. The reduction in the value of the products of both between 1919 and 1927 was due to a decline of prices, and not to a reduction of output.

The business interests of the Mississippi valley will have a rude awakening when they learn that they have not been in process of being ruined by the destructive competition of the manufacturers of the "seashore" states. When people are so anxious to believe they are being ruined it is really a pity to disillusion them.

Indexes to Volume 89

The indexes to the latest volume of the *Railway Age*, July to December, 1930, are now ready for distribution. Those desiring copies should advise the New York office, 30 Church Street.

The Railroads Will Win Through *

New designs of equipment and co-ordination will end competitive menace— Should be encouraged to engage in all forms of transport

By General W. W. Atterbury
President, Pennsylvania

RAILROAD securities constitute the very basis of our investment structure. Some $18,000,000,000 face value of these securities are held by the American people. To what extent the public shall have confidence in them and shall invest in them is a vital question affecting not only the railroads, in their ability to obtain new capital, but also a huge amount of savings which have been entrusted to insurance companies, banks and other institutions and invested by them in railroad development. Confidence in railroad securities therefore constitutes a foundation stone of the whole national structure of public confidence in our business and economic stability.

In like manner, railroad service is so closely related to the continuing ability of American industry to carry on that I for one believe the railroads will have more, not less, to do in the future. There is nothing in sight that offers any real substitute for, or even approach to, the railroads for low costs, high speed, safety, dependability and mass transportation all year round and in all weathers. That does not mean the railroads should have a monopoly on transportation. It does indicate, however, the importance of getting a true perspective of such transportation developments as are currently taking place.

Transport Should Be Co-ordinated

I believe the railroad outlook is a wholesome one. I will summarize it in terms of factors of progress that are of outstanding importance:

1. Progress in establishing a basis for sound co-ordination of other forms of transportation with the railroads which will enable the public to utilize the kind of transportation it wants—railway, highway, waterway and airway—in the field in which each can best and most economically perform.

I believe such a system of co-ordinated transportation is well on its way and that it will bring financial advantages to all concerned, including the public which will profit from better service. It involves, of course, some change in public policy, particularly recognition of the fact that the advantages of competition cannot be preserved by permitting uneconomic and subsidized agencies to jeopardize the existence of those which are sound and self-sustaining.

2. Progress in the art of railroad operation itself which in the last ten years has enabled American railroads to establish new high standards of service, to reduce their operating ratios in the face of steadily lower ton-mile revenues and declining passenger business, and to improve their physical plant to the extent of more than $6,000,000,000.

They are in a splendid condition to go forward when business revives.

3. Progress on the part of the railroad industry in readjusting its methods and practices with a view to bringing back to itself the transportation of commodities which have tended to move some other way.

Active research is now under way looking toward redesigned equipment suitable to the changed requirements of business in these commodities. It is not too much to expect that the railways will provide means of handling them quicker, cheaper and more profitably than they are now moving.

4. Progress in consolidation as represented by agreement on the essential factors of a four-party plan in the Eastern district.

Realization of this plan is of course a matter of the future; most of its details remain to be worked out; it must be submitted to the Interstate Commerce Commission which alone can and should decide the question of public interest involved and then actual amalgamation must be effected. Nevertheless this is a real step forward and I am sure you will agree with me that it has already removed a very disturbing element of uncertainty affecting the whole fabric of business.

I might add another factor which is more or less psychological but nevertheless important as regards the course of the railroad industry. It was very well expressed by my colleague, Elisha Lee, when he told the Railway Business Association recently that our railroads have taken too much on the chin with a smile and that they were now going to assume a more aggressive stand as an institution entitled to the respect and consideration of those responsible for public policy affecting their interests.

Railways Have the Ability to Meet Crisis

No apology is necessary for the railroad industry in this country. Nor does it expect any favored treatment. The importance of the railroads' place in our national economy, the services they perform for industry and commerce and in sustaining trade and employment, and the tremendous volume of American savings represented in their capital investment are well known though not always realized by the public. Moreover, I have the utmost confidence both in their own ability to meet any crisis in their affairs and in the fairness and certainty of the American people to recognize and support any constructive program they may advocate.

The fundamental basis of railroad progress in the United States has been its ability to provide the most economical and convenient transportation obtainable. This has been true in every stage of its development. Our physical plant has been built and extended across the country. Internally it has been perfected and improved so that its continuing efficiency is assured. Now we are entering upon a new stage, a period of expansion

* An abstract of an address by General Atterbury at a luncheon given in his honor by Calvin Bullock, New York, February 10.

into new forms of transportation and in this period also the requirements for success remain the same, namely, to produce economical transportation notwithstanding changed conditions.

These changed conditions are principally due to the development of larger centers of population and the rise of the motor industry with its accompanying growth of paved highways and the popularity of the motor car for both pleasure and business. Especially in the industrialized and more densely settled sections of the country what was once a predominantly rural population has become predominantly urban.

This transition has had a peculiar effect upon the railroads. Although they themselves were principally responsible for American industrial growth and for the development of the larger centers of industry and population, these centers have grown so huge as to create a new problem for both railroads and industry—the problem of reducing distribution costs, especially in the terminal areas where handling charges have become a disproportionate part of the total transportation cost.

It was only natural for business to turn to the motor industry as an apparent solution of this problem. It was only natural also to turn to the motor truck operating on improved highways as a possible means of reducing transportation costs outside the terminal area. But as more scientific study has been applied to both these ventures it has become evident that real progress lies not in ruthless, independent action on the part of railroads and motor agencies or the elimination of one in favor of the other, but in the development of both as supplements to each other.

Move Truck Bodies by Rail

Such a course simply recognizes certain obvious facts: Motor transportation is best adapted to the terminal area; railroad transportation is best adapted to the longer haul. On the Pennsylvania Railroad in addition to using trucks in place of local freight trains in certain districts we are putting into actual operation in the larger terminals plans which effectuate co-ordination on that basis. I look forward to such a development of these plans in the next few years as will enable less than carload freight and, to some extent, carload freight to move direct from consignor to consignee without rehandling, that is, in containers or truck bodies, hauled by motor to the railroad at the point of origin and from the railroad at the point of destination.

Moreover, we expect to accomplish this improvement to the financial advantage of both the railroad and the trucking interests, as well as to those who buy the transportation service. For the railroads and trucking companies, it means moving freight at less cost and at greater potential earnings to each of them. For the public it means less cost for packing and stowing and cheaper transportation from manufacturer to consumer.

P. R. R.'s Investment in Motor Vehicles Profitable

The motor bus, too, properly co-ordinated with the railroad can be operated to the mutual advantage of both and with benefit to the public. Consequently, I do not anticipate that the motor bus will deprive the railroad of substantially any more passengers than the interurban electric lines would have done if they had survived and expanded. Operated as supplementary to the railroads, the bus has a real place in the transportation picture. For instance, in enabling the railroads to replace uneconomic local train service and thus to speed up their through service, to operate as feeder lines and to provide additional service which is evidently desired by the public.

All of this is by no means theoretical. On the Pennsylvania Railroad most of it is in actual practice as regards both trucks and buses in the terminal areas and on the highways. We have taken a financial interest in trucking companies and bus lines, not for the purpose of restricting their operations, but of co-operating with them to our mutual benefit and to improve our joint service to the public. I am happy to say, too, that the Pennsylvania Railroad's co-operative investments in these fields of co-ordinated transportation is today a paying investment, financially and otherwise.

I have gone into some details on this subject for two reasons: First, because it illustrates the principle which should be applied to the co-ordination of other forms of transportation and, second, because I would like emphatically to dispel the idea that the sound development of motor transportation offers any serious threat to the railroads. It does not. If the railroads act intelligently they will give to the motor industry their terminal deliveries and if the motor industry acts intelligently it will give the longer haul to the railroads. I am sure they will be able in that way to give the public cheaper transportation without sacrifice to each other. Besides, it would be utterly futile for either to think that it or both of them could long stand in the way of American industry in its necessity to find the most economical distribution of its materials and products.

The fact is that any essential form of transportation should not be restricted in its economical sphere of activity. It should be permitted to give the public maximum service at minimum cost. The process of co-ordination is essentially an economic one.

As you probably know, investment has also been made by the Pennsylvania Railroad in the shipping industry on the principle that support of lines soundly planned, financed and managed and offering a prospect of satisfactory returns, is not only good for the railroad but good for the public. In other words, the business of the railroads is transportation and therefore they should extend the scope of their service to all agencies of transportation in the interest of developing a co-ordinated system that will give the public the obvious benefits to be derived from it.

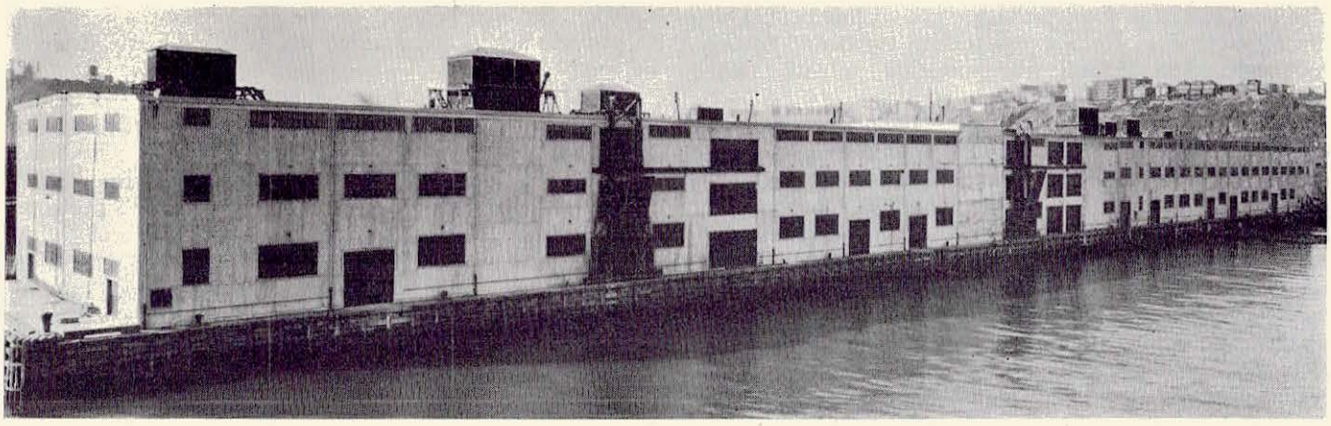
Subsidized Transport an Economic Fallacy

The economic fallacy of subsidizing artificial waterways through taxation and then denying the railroads alone the privilege of using them, although the two could be economically co-ordinated, will sooner or later be recognized and corrected. There is no sound basis either for barring the railroads from the Great Lakes and the coast-wise and intercoastal trade.

Now as to the progress in the railroad art itself: Altogether apart from such developments as electrification and more efficient handling of equipment and personnel, some striking readjustments are under way or being studied with a view to meeting changed requirements. Take the motor car industry which has been seeking and finding new ways to deliver automobiles. Research has already been undertaken to redesign equipment suitable to handling automobiles by railroad, cheaper, quicker and in better shape than they are now being handled and without any loss of rail return.

We have not yet reached the limit in size of cars and trains. Moreover, cost of distribution is still the controlling factor in American industrial operations. It is

(Continued on page 368)



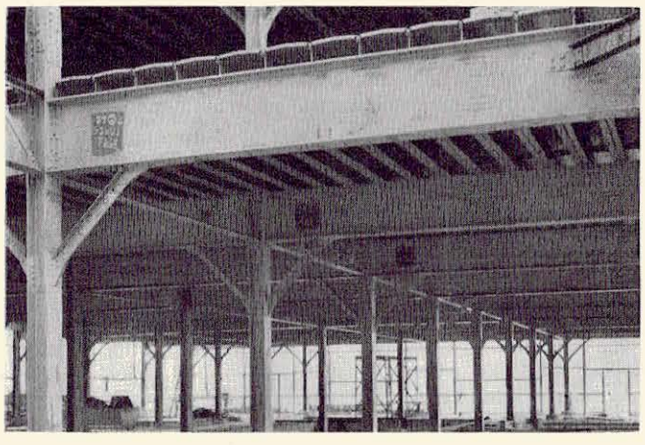
A View of the Completed Pier, Showing Dock-Side Elevators

Novel Floor Construction Feature of New Pier

Erie makes first use of new design to permit the building of a three-story structure on a foundation designed for two stories

THE Erie Railroad has just completed a new export pier at New York, and has another under construction, which embody a number of unique features in pier construction, and, in fact, in general building construction where certain of the features are equally applicable. The most outstanding of these features is the type of floor system employed, which was designed especially to meet the requirements presented by piers, of light weight with large load-carrying capacity, and speed and economy in construction.

Both of the new piers are on the New Jersey side of the Hudson river, directly opposite New York City, one within the limits of Jersey City, and the other in Weehawken. Both piers are of equal interest in that they involve the same general features of construction, but in view of the fact that the Weehawken pier, known as Pier D, is now completed, this article will be confined entirely to that pier. This latter pier, which was put in service on January 21, was erected complete above its foundation in 12 weeks.



Looking Up Under the Lower Channelplate Deck of Pier D During Construction

General Description of Pier D

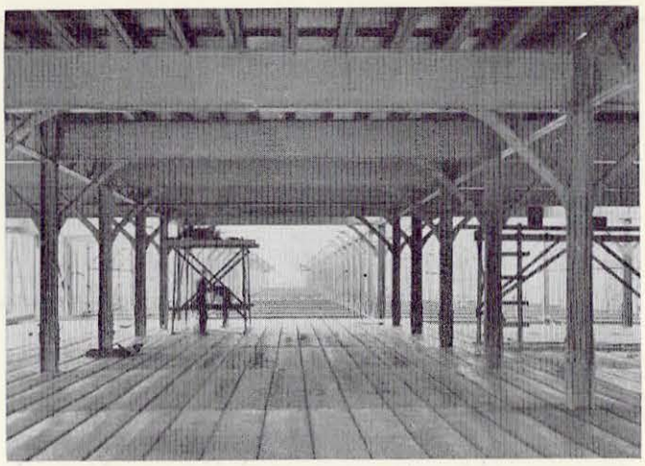
The Weehawken pier is a three-story, steel-frame, fireproof structure, 738 ft. long by 97 ft. wide, supported on untreated timber piles. The main deck of the pier consists essentially of two concrete car-delivery and trucking platforms, 33 ft. 6 in. wide and at car-floor height, separated by two service tracks on 17 ft. centers, which extend practically the full length of the building. The second and third floors, both of which will be used for storage and for the transfer of cargo to and from ships, are supported on five rows of I-beam columns, spaced 24 ft. center to center, these including the wall columns. On the first floor, the center row of columns lies between the pier tracks, while the two other rows of intermediate columns extend down through the main platforms, 9 ft. 6 in. back from the inner edge of the platform in each case.

The pier is entirely enclosed with Armco corrugated iron except for large areas of Truscon sectional steel sash with pivoted ventilating sections on each floor, and numerous Truscon bi-folding, top-hinged swinging cargo doors, which are provided at intervals along both sides of each floor. The roof of the pier is of the low double-pitched type, sloping to each side from the center, and is carried by the side wall columns and a single row of columns longitudinally through the center.

While of fireproof construction throughout, the pier is equipped on all floors with a pre-action dry-pipe sprinkler system and a separate remote-control hydrant system with 12 hose connections, provided as protection

to cargo on the pier and to make it possible to secure more favorable insurance rates.

Eight elevators are provided, four within the building and four outside. The inside elevators, of which there are two on each side of the pier, are of the Otis electric type, and of four tons capacity. The outside elevators, of which there are also two on each side of the pier, are called Dock Side elevators, and are likewise of four tons capacity. These latter elevators, which were manufactured by the Colby Steel & Engineering Company, Seattle, Wash., are of a type in which the horizontal carrying platform moves up and down vertically in a tower frame which can itself be moved longitudinally along the pier. With this type of elevator, cargo can be taken from any of the floors of the pier and placed on any deck of a ship, or vice versa, at any stage of tide as readily as from one floor of the pier to another.



Looking Over the Incompleted Second Deck at Pier D

Foundations a Limiting Factor

One of the noticeable contrasts between the Erie's new Pier D and other piers in the New York harbor is the fact that it is a three-story structure, whereas the other piers are either one or two stories high. The reason for the general limitation of the piers to two stories has been solely one of foundations capable of carrying its superimposed loads. With the silt of the Hudson River bed extending to considerable depths along both the New York and New Jersey waterfronts, piling has been used generally for pier foundations, in spite of the fact that the load-carrying capacity of individual piles is relatively low and, therefore, calls for the unusually close spacing of the piles to secure adequate support for even a two-story structure of the usual type of construction.

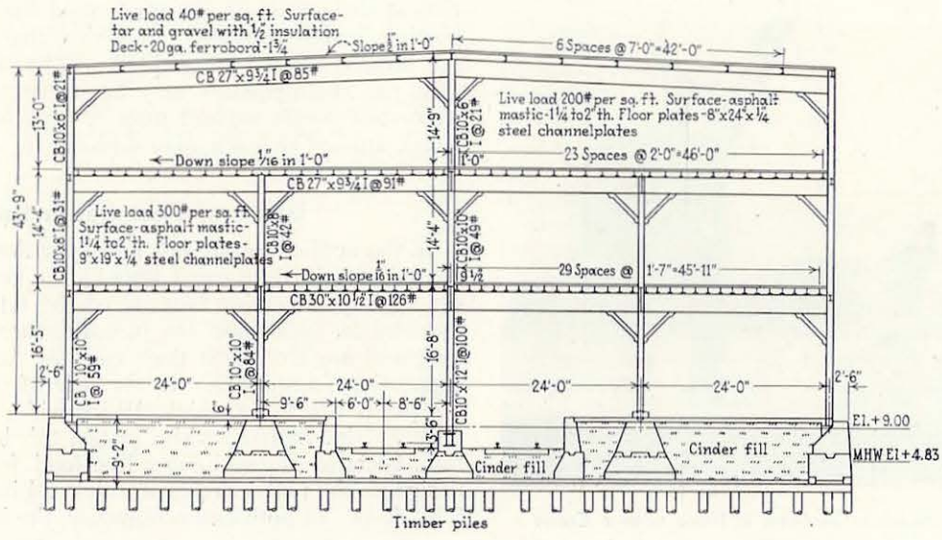
As a matter of fact, considering these limiting factors, the foundation of Pier D, which was constructed in 1929, was designed for a two-story structure of steel and concrete construction. To secure adequate support for such a structure, approximately 5,000 piles were driven, ranging from 80 ft. to 110 ft. in length, and, in the clusters to support column loads, were placed as close as 2 ft. 6 in. center to center. This close spacing was necessary because of the uncertainty of the bearing power of the individual piles, which extended over a considerable range and made it necessary to specify the relatively low allowable loading of 15 tons for each pile.

Plans Changed to Provide Three Stories

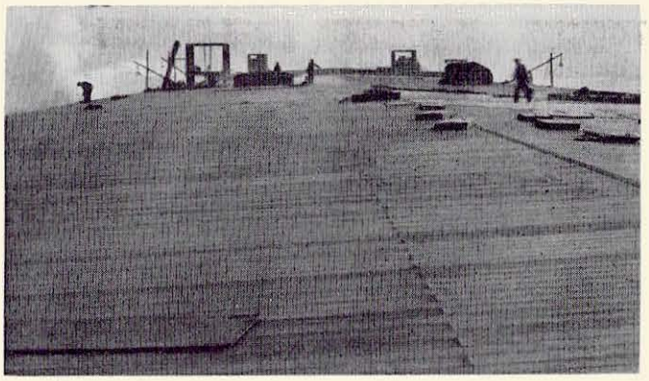
Considerations which arose subsequent to the completion of the pier foundation and lower deck, but before actual work on the superstructure was started, pointed to the desirability of making the pier a three-story structure. Study of the situation showed that this could be done only by a change in design, employing a lighter type of construction than had been contemplated in the two-story structure planned.

In the original plan, the superstructure was to have a structural steel frame, corrugated iron siding, a precast cement tile roof resting on steel purlins, and a second floor of reinforced concrete, 5½ in. thick, carried on I-beams, designed for a live loading of 400 lb. per sq. ft. Calculations showed that with this type of construction, the total dead and live loads on each pile would be approximately 13 tons, made up primarily of the following items: The dead weight of the first deck, which had already been constructed, plus a live load of 500 lb. per sq. ft. for which this deck was designed; the dead load of the roof, which was figured at 25 lb. per sq. ft., plus a live load of 40 lb.; the dead load of the second floor, which was figured at 75 lb. per sq. ft., plus the live load of 400 lb. for which it was designed; and the weight of the steel in the structural framework.

With a limit of bearing on the piles of 15 tons and a design for a two-story structure which would cause a loading of approximately 13 tons per pile, it was obvious that the design would have to be changed materially if it were to be possible to erect a three-story structure on the existing foundation. With the first deck already constructed for a loading of 500 lb. per sq. ft., and structural steelwork accepted as desirable in


Live load 40# per sq. ft. Surface-tar and gravel with ½ insulation
Deck-20ga. ferrobora-1¾
Slope ¼" in 1'-0"
6 Spaces @ 7'-0"=42'-0"
CB 27"x9¾"I @85#
Live load 200# per sq. ft. Surface-asphalt mastic-1¼ to 2" th. Floor plates-8"x24"x¼ steel channelplates
Down slope 1/16 in 1'-0"
23 Spaces @ 2'-0"=46'-0"
CB 27"x9¾"I @91#
Live load 300# per sq. ft. Surface-asphalt mastic-1¼ to 2" th. Floor plates-9"x19"x¼ steel channelplates
Down slope 1/16 in 1'-0"
29 Spaces @ 1'-7"=45'-11"
CB 30"x10½"I @126#
24'-0"
9'-6"
6'-0"
8'-6"
E1.+9.00
MHW E1.+4.83
Cinder fill
Timber piles

A Typical Section Through the Pier



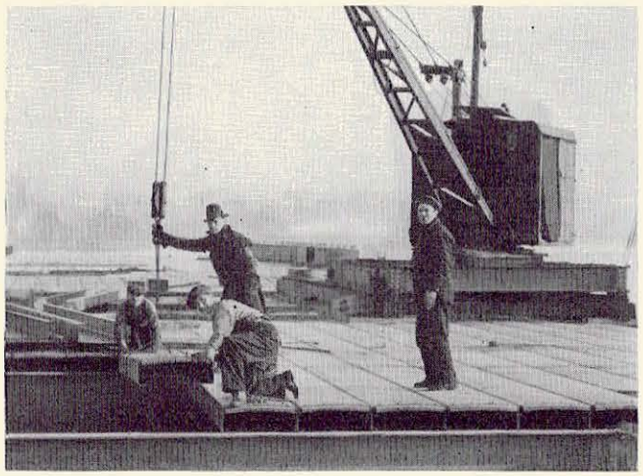
The Ferrobord Roof Before Coating, Which Saved Considerable Weight

any type of construction to be employed, it was equally obvious that in making provision for a third floor and at the same time staying within the allowable load per pile, the major savings in weight would have to be made in the floor and roof construction.

Battleship Deck Construction Considered

In recognition of this fact, therefore, in considering a three-story structure, battleship deck construction was considered for both the roof and the second and third floors, the floors to be designed for live loadings of 300 lb. and 200 lb. per sq. ft. respectively, and the roof for the same live loading of 40 lb. In this design the roof was to consist of 30-in. by 3/16-in. steel plates, welded or riveted to 5-in. I-beam purlins on 2 ft. 6 in. centers, and covered with Celotex and built-up roofing. The third floor was to be made up of 24-in. by 5/16-in. floor plates, welded or riveted to 8-in. I-beam joists on 2 ft. centers, and the second floor was to consist of 24-in. by ⅜-in. plates welded or riveted to 10-in. CB I-beams on 2 ft. centers. Both floors were to be provided with a 1¼-in. wearing surface of asphalt mastic. With this type of construction, the dead load of the roof was cut to 16 lb. per sq. ft., which, with a live load of 40 lb., gave a total load of 56 lb. per sq. ft., the dead load of the third floor amounted to 37 lb. per sq. ft., which, with a live load of 200 lb., gave a total load of 237 lb. per sq. ft.; and the dead load of the second floor amounted to 41 lb. per sq. ft., which, with a live load of 300 lb., gave a total load of 341 lb. per sq. ft.

Thus it will be seen that, comparing the two-story structure as planned with the three-story structure using battleship deck construction in the roof and upper floors, whereas the combined live and dead loads of the roof and second floor of the first type of construction was 540 lb. per sq. ft., the combined live and dead loads of the roof and the second and third floors of the battleship construction totaled only 634 lb. per sq. ft., an increase in weight per ft. of only 94 lb. This increase was permissible since figured into the building as a whole, it gave a loading of only 14.5 tons per pile, or within the allowable limit of 15 tons per pile.



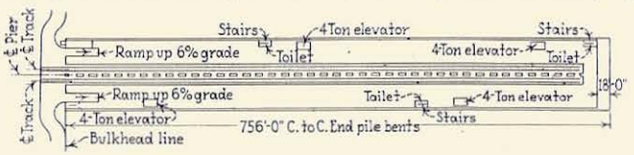
Setting the Channelplate Sections in Place with a Crane

The problem of erecting the three-story structure on a foundation intended originally for a two-story structure had been met in the battleship deck construction, but the main drawback to this design was the high cost of the extensive riveting or welding which it involved. Furthermore, there was an element of uncertainty as to just how this type of floor system would act under heavy loads, particularly concentrated loads which might exceed the allowable maximum.

New Type Floor System Adopted

While consideration was being given to these matters, a new type of floor construction was suggested to the Erie, which permitted a three-story structure and promised a number of advantages and economies over the battleship deck construction. Study of this construction led to its adoption and use in both the second and third floors, while the steel plate construction planned for the roof gave way to the use of Truscon Ferrobord to reduce its dead weight.

The new type floor system consists essentially of a series of channelplate sections, newly designed, which are pressed from open hearth steel plates of varying



First Floor Plan of Pier D

thickness into a shape resembling a channel, but with their tops, or broadest surfaces, arched to provide a standard crown height of ¾ in. These channelplates, which are shown clearly in the accompanying illustrations, are laid adjacent to each other, with their concave surfaces downward, which brings the webs of adjoining plates together. The double webs thus formed are bolted together and, with their respective flanges form I-beam sections at intervals corresponding with the width of the plates. The channelplates are carried at their ends on the girders of the structural supporting frame provided, to which their lower flanges are bolted, riveted or welded. The wearing surface over the channelplates may be of concrete reinforced with steel mesh, asphalt mastic, or other suitable material, applied in each case directly to the channelplate construction.

Details of Floor Design Used

In the application of this new type floor system to the second and third floors of Pier D, the channelplates differ slightly in section because of the different live load imposed on each floor, but in both cases they are 18 ft. long and are riveted at their ends to the girders of the supporting framework. In the case of the second floor, the plates are ¼ in. thick, 19 in. wide, and 9 in. deep, with 3¼-in. flanges, while in the third floor construction, because of the lighter live load for which it was designed, the plates are ¼ in thick, 24 in. wide and only 8 in. deep. In both cases, however, the individual plates

are crowned ¾ in., and adjacent plates are bolted together by nine ⅝-in. bolts spaced equally. At the ends of abutting channelplates, directly over their supporting girders, end stiffeners are provided which consist essentially of curved channel pieces, about 4 in. wide, which are held up under the inverts of the plates by being riveted to one of the plates.

To meet the variations from standard construction which occurred about columns, in corners, about floor openings and along walls, a number of special construction details were involved. At many points the standard plates had to be notched to fit, practically all of this notching or cutting, however, having been done in the shop during fabrication. Other construction details involved filler plates for closing in narrow spaces between series of standard channelplates or between outside channelplates and the side walls, and side and end curb angles, riveted to the top faces of the plates at the side and end walls, and around floor openings, to retain the edges of the wearing surface provided.

In both upper floors the channelplates were covered with Johns-Manville asphalt mastic, industrial type flooring, having a maximum depth of 2 in. over the recessions between plates and a minimum thickness of 1¼ in. over the crowns of the plates. This mastic was put on at 400 deg. F., in three applications, by hand tools.

New Flooring Offered Advantages

With the channelplate type of construction, the dead weight per square foot of the third floor is 40 lb. and that of the second floor, 44 lb., as compared with the dead weight figured for these floors, using battleship deck construction, of 37 lb. and 41 lb. This slightly increased weight per foot for the channelplate construction was brought about by the increased amount of asphalt mastic used with this type of construction over the uniform 1¼-in. course planned over the flat steel plate construction.

In addition to its quality of lightness, the channelplate construction afforded a number of other advantages, among which were simplicity and uniformity of sections, speed of erection and economy. One of the most favorable advantages of this construction was that it could be built up as fast as its supporting framework and without the use of temporary formwork or shoring. This not only resulted in fast and economical erection, but allowed clear space beneath each floor for the work of other trades. Along the same line, inasmuch as the channelplates provided a closed working floor as fast as set in place, access to each floor for further construction operations was immediate, and furthermore, the solidified floor provided a factor of safety for all workmen operating above or below it.

Roof Structure Lightened

The roof construction adopted in place of the battleship deck considered, consists of Truscon 20-gage Ferrobord on 9-in. channel purlins spaced 7 ft. center to center. This is insulated with ½ in. of Celotex, on top of which is a Barrett built-up tar and gravel roof coating. Through this type of construction, the dead load of the roof was cut from the 16 lb. per sq. ft. in the battleship deck design, to 8 lb. per sq. ft. This 50 per cent reduction in the dead weight of the roof structure countered the slightly increased weight of the channelplate floor system over the battleship deck design, with the net result that the total load per pile under the type of construction adopted was about the same as in the case of the battleship deck construction, or approximately 14.5 tons.

All of the work in connection with the new pier was carried out under the direction of G. S. Fanning, chief engineer of the Erie, assisted by F. A. Howard, engineer of structures, A. M. Knowles, assistant engineer of structures, Graham King, architect, and C. H. Splitstone, superintendent of construction. The actual work at the pier was under the direction of H. A. Pasman, resident engineer. The channelplate floor construction was designed and fabricated by the Truscon Steel Company, which is now marketing this type of flooring generally, but actual erection was done by Foley Brothers, Inc., St. Paul, Minn., who were the general contractors on the work.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended January 31 amounted to 719,281 cars, an increase of a little over 3,000 cars as compared with the week before but a decrease of 179,554 cars as compared with the corresponding week of last year and of 227,873 cars as compared with 1929. Reductions were reported as compared with both years from all districts and as to all commodity classifications. The largest decreases as compared with last year were in the loading of coal, which was off 68,797 cars, and in miscellaneous freight, which was off 59,202 cars. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, January 31, 1931			
Districts	1931	1930	1929
Eastern	166,913	210,772	225,650
Allegheny	145,179	183,796	190,311
Pocahontas	43,083	59,683	57,585
Southern	113,546	132,583	149,028
Northwestern	87,107	109,471	107,104
Central Western	106,706	132,095	139,515
Southwestern	56,747	70,435	77,951
Total Western Districts	250,560	312,001	324,580
Total All Roads	719,281	898,835	947,154
Commodities			
Grain and Grain Products	42,506	44,601	49,736
Live Stock	23,300	28,094	27,514
Coal	141,735	210,532	211,093
Coke	8,898	12,443	12,481
Forest Products	36,037	48,477	59,416
Ore	5,635	7,682	8,671
Mdse. L.C.L.	211,543	238,177	245,766
Miscellaneous	249,627	308,829	332,477
January 31	719,281	898,835	947,154
January 24	715,690	862,346	926,474
January 17	725,938	847,155	931,861
January 10	714,251	862,461	914,438
January 3	615,382	775,755	798,682
Cumulative total, 5 weeks	3,490,542	4,246,552	4,518,609

The freight car surplus for the week ended January 24 averaged 650,003 cars, including 348,755 box cars, 230,797 coal cars, 29,228 stock cars and 14,674 refrigerator cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended January 31 totaled 46,604 cars, a decrease from the previous week of 1,009 cars and a decrease from the same week last year of 12,471 cars.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
January 31, 1931	46,604	28,316
January 24, 1931	47,613	28,028
January 17, 1931	47,115	27,491
February 1, 1930	59,075	39,010
Cumulative Totals for Canada		
January 31, 1931	221,647	130,574
February 1, 1930	269,786	174,944
February 2, 1929	281,709	188,224

Greater Efficiency in Railway Service *

By D. L. Forsythe†

THERE was a time, not so long ago, when a locomotive was considered in the same class as an animated being, such as horse or an ox, with a certain number of hours allotted to it as a day's work. It is only recently that operating and mechanical officers have realized that the locomotive is simply a machine and, if in good condition, can be operated indefinitely under certain conditions. It has been demonstrated on the St. Louis-San Francisco that a locomotive in good condition and properly handled can produce as many ton-miles in one month as it formerly did in three months. In other words, proper conditioning and handling of locomotives will increase locomotive efficiency, which is a decided factor in transportation efficiency. Please understand I don't mean that you can take any old locomotive and run it from hell to breakfast, but I do mean that you can take a modern locomotive and put it in such condition (water conditions permitting) that you can run it a month without bringing it into the barn to be curried down, fed and laid to rest preparatory for the next day's work.

I have often wondered if the locating engineers on some railroads ever realize that it is cheaper to pump the water to the top of the hill and locate tanks there, instead of putting the tanks along the river banks and in the valleys where locomotives must stop at a low elevation and then drag up the hill with a tonnage train. If the tanks could be located on top of the hills, time and fuel would be saved. There are many factors in efficient railroading, and the proper location of water tanks and coaling stations is one of them.

Long Runs Demand Modern Locomotives

The Northern Pacific ran a locomotive in freight service 1,897 miles from Seattle, Wash., to the Twin Cities, Minn., without cutting the locomotive off the train.

The Santa Fe and the Southern Pacific are running passenger locomotives from El Paso, Tex., to Los Angeles, Cal., 815 and 888 miles, respectively, without changing locomotives.

The Illinois Central is running locomotives from New Orleans, La., to Chicago, a distance of 922 miles, without changing power; the Canadian National, 801 miles; the Boston & Maine, 338 miles, as far as they can go.

The Frisco, in 1927, ran a Mikado freight locomotive, No. 4100, between Kansas City, Mo., and Birmingham, Ala., 735 miles, or a total of 2,900 miles without knocking the fire. This locomotive, a coal burner, was operated over six subdivisions, 24 crews being used.

In 1929 the Frisco ran locomotive No. 4113 24 days, making 7,350 miles between Kansas City and Birmingham without knocking the fire.

In August, 1930, the Frisco ran a locomotive 9,743 miles in 31 days between Kansas City and Birmingham. This is a Mikado type locomotive, No. 4213, built by the Baldwin Locomotive Works in 1930. This locomotive was under steam continuously 740 hours without having the fire knocked. It had 80 different crews and handled an average of 2,661 tons during the time the locomotive was running the full month of August.

These tests of the Frisco were made with three objectives in view: First, to prove definitely that a freight locomotive could be run for an entire calender month without the flues getting stopped up to such an extent as to impair the steaming qualities. Second, to see if a freight locomotive could be run without having the fires knocked and the boiler washed out from one federal inspection to the next. Third, to see if the engine would steam as well at the completion of the trip of 31 days as it did the first trip. Only the most up-to-date locomotive, properly-operated, could stand this kind of service with different grades of fuel and using several kinds of water.

A check-up on the saving of locomotives on trunk lines out of Chicago shows that 60 locomotives are doing the work of 110 formerly used. The non-productive time of locomotives has been materially decreased and will further decrease.

Many economies have been worked out in the past few years, but the operating officer of the future should be conversant with every phase of railroading not only to move a large number of tons per train, but to move it at high speed. Intensive use of the modern power plants on wheels is what will be expected of the railroads of the future.

Great accomplishments will be made in the future and at no distant day 2,000 to 3,000 miles will be made without changing power at intermediate terminals. Locomotive tanks will be built to hold 30,000 gal. of water and 30 tons of coal, and possibly 8,000 gal. of fuel oil. Stopping under 100 miles for coal or water will be as obsolete as the saturated locomotives with oil cups and melted tallow for lubrication.

Locomotive builders have always appreciated suggestions and help from railroad supervisors. The suggestions made to the builders and their ready and hearty co-operation together with their knowledge of how the locomotives should be built is producing new motive power that can be kept in active service and that offers a field of greater economies in railroad transportation. What the locomotives of the future will be we don't know, but we do know the improvements that have been made in the past 10 years in the design and construction of locomotives will be an incentive for the keenest minds in the mechanical departments to perfect the locomotive still further into a more efficient and economical machine.

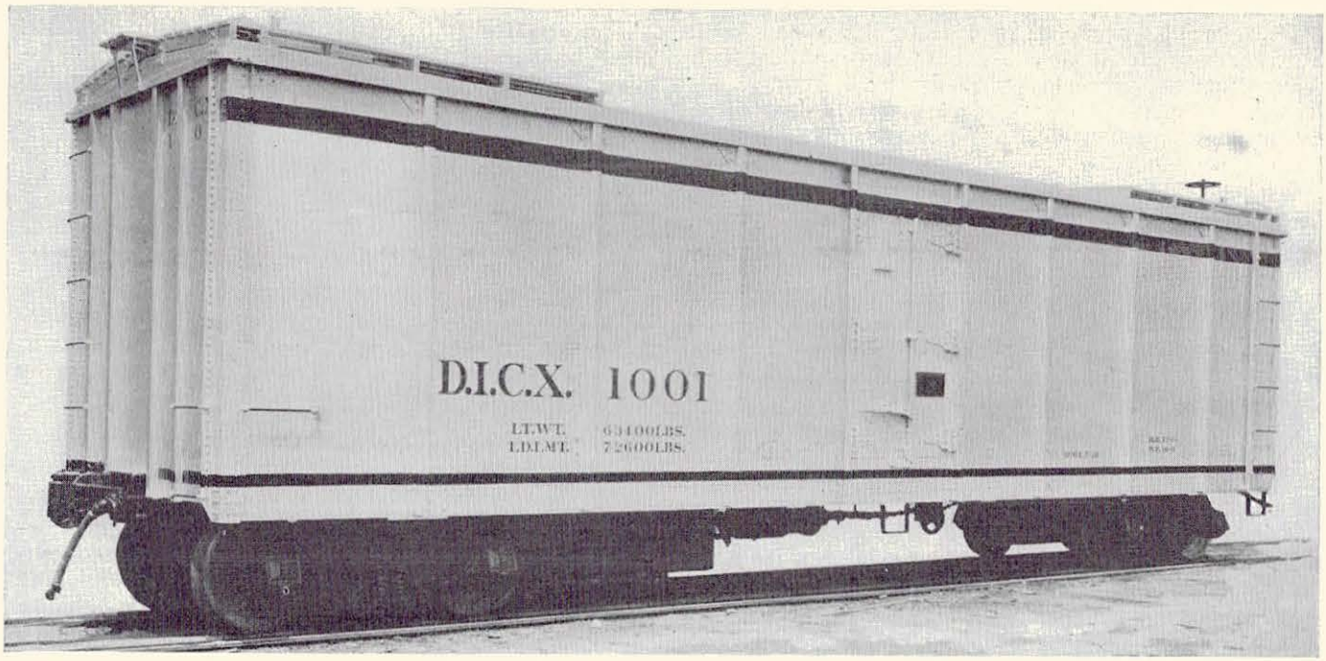
Supervision the Key to Performance

As yet I have said very little about the human element which is the most important factor. It makes no difference how efficiently water is converted into steam in a locomotive boiler, if the man on the right side does not use this steam as he would use his money, all the savings in coal and locomotive design is wasted. This is no reflection on the present-day engineman, but we know there are some of us in every rank of life that can do one job better than the rest of us, due perhaps to better training. Give the other fellow the same training, or experience, or opportunity that the first one has and the chances are he will duplicate the first fellow's work.

This, then, means supervision. There is not a man on any railroad on any job that cannot absorb a little information from someone else. Therefore, if the supervisor is properly trained, and if he, in turn, imparts the additional knowledge gained through this training to the other fellow, it won't be long until every man under him will be an expert in his particular line.

* Excerpts from a paper entitled "Further Possibilities of Efficiency in Railroad Transportation," presented before the St. Louis Railway Club, January 10, 1931.

† The author is general road foreman of engines, St. Louis-San Francisco with headquarters at Springfield, Mo.



A Steel Refrigerator Car Built for Solid Carbon Dioxide Refrigeration

Transporting Perishables With "Dry-Ice"

Progress in development of refrigerator cars has arrived at stage where commercial use is practicable

By C. L. Jones

Vice-President, DryIce Corporation of America, New York

THE DryIce Corporation of America and the American Car & Foundry Company have co-operated in testing and developing refrigerator cars for use with Dry-Ice. This development has involved the construction of several cars.

The first solid carbon dioxide ever produced and sold commercially as such was marketed by the DryIce Corporation of America in 1925. Between that time and this, the market has been extended by the development and introduction of methods pioneered by this company for the use of the product in the truck transportation of ice cream, fish and meat and in carton shipment of ice cream, frozen products, meat and berries. In addition a number of minor uses have been developed commercially, and a number of additional uses have been developed and held in reserve pending the time when, it is hoped, the volume of the product marketed may justify even wider distribution and lower prices than at present.

Chemically, Dry-Ice is merely solid carbon dioxide, CO_2, the same healthful gas used in carbonating beverages. It is intensely cold, approximately —109 deg. F. and evaporates without residue to form about 500 volumes of cold CO_2 gas per volume of Dry-Ice. Its commercial application rests entirely on the recognition of its peculiar properties, and their employment in commercial structures to take advantage of these properties in generating values of time, convenience, quality, or result sufficient to justify a cost per pound much higher than water ice.

Thus, the carbon-dioxide gas evolved in its evaporation has a heat conductivity about 40 per cent less than that of air, and, properly used, this is an important factor in many uses of Dry-Ice in reducing the amount of heat entering various structures, and thus reducing the amount of Dry-Ice required.

Effect of the Gas on Perishables

The gas has specific effects on many fruits, vegetables and flowers quite aside from refrigeration. A research fellowship supported by DryIce Corporation at Boyce Thompson Institute for Plant Research has made a study of many products at various temperatures in varying concentrations of carbon dioxide gas. Some of the results of this work were summarized in a paper by N. C. Thornton, published in Industrial and Engineering Chemistry, November, 1930, on "Carbon-Dioxide Storage of Fruits, Vegetables and Flowers."

* Abstract of a paper presented at a meeting of the American Fruit and Vegetable Shipping Association, held at Chicago, January 20, 1931.

These results need not be reviewed in detail here. In a general way at some concentration, varying with the product treated, definite benefits from CO_2 are observed. Respiration of the tissues is retarded, often slowing down to 50 per cent of normal with as little as 10 to 15 per cent CO_2.

A further effect of such proper concentrations is to keep down the growth of molds and bacteria, and to prolong the storage life of many fruits and vegetables without injurious after effects. Mere mention of the work of the United States Department of Agriculture and of the British Food Investigation Board on CO_2 gas storage of apples will probably be sufficient support of the general statement that proper concentrations of CO_2 are helpful to some products.

A more spectacular demonstration may be taken from Thornton's work, where 5 to 15 per cent carbon dioxide prolonged the salable life of cut roses under strictly comparable conditions from three to seven days,—over 100 per cent increase in shelf life. The results obtained were consistent for a range of temperatures from 33 deg. F. to 50 deg. F. and for at least three distinct varieties of roses.

It was found that for each product tested, there is some concentration of carbon dioxide above which this gas is definitely injurious, producing different forms of breakdown of the fruits and vegetables, which are of no interest whatever in commercial refrigeration with Dry-Ice except insofar as they indicate what concentration of CO_2 must be avoided.

The idea of transport equipment refrigerated with Dry-Ice is no longer novel. Over 1,500 Dry-Ice trucks in service in the ice cream and meat industries are sufficient proof that Dry-Ice under favorable economic conditions is a satisfactory transportation refrigerant.

The Dry-Ice Refrigerator Car

Following what has been said it will probably be apparent, that the problem of introducing a Dry Ice refrigerator car divides itself into four problems:

1—Satisfactory refrigeration must be delivered under sufficiently close temperature control in a practical and dependable car.

2—Such refrigeration must be delivered conveniently at a competitive cost, all collateral advantages considered. Up to this point the problem is much the same for any novel method of refrigerated transport—mechanical or otherwise.

3—The concentration of CO_2 must be dependably and simply controlled to produce the greatest benefit:
- a—In insulating the product carried and thus decreasing the amount of refrigerant or insulation required.
- b—In slowing down respiration, thus making it possible to transport products in equally good condition at higher temperatures than heretofore.
- c—In preserving the product carried and preventing growth of molds and other undesirable changes.

4—The finished car must be so exploited that there is a minimum disturbance in the status quo in the methods and organizations involved in the ownership and servicing of standard water-iced cars.

A steel refrigerator car was constructed in the spring of 1930 in the Chicago shops of the American Car & Foundry Company. This car has since been continuously engaged in hauling test loads of various products, principally meat, eggs, ice cream and frozen products, for the purpose of accumulating practical experience in the use of the car before proceeding further with the introduction of such cars. This car is a 40-ft. refrigerator car of approximately standard inside dimensions, but heavily insulated with 7 in. of DryZero insulation. Its outer steel shell has been effectively gas proofed by methods developed in the construction of earlier experimental cars.

The Dry-Ice is contained in two heavily insulated metal bunkers at the upper ends of the car, which include in their construction radiators for cooling the atmosphere of the car. These bunkers are gas-tight and provided with an effective and proved means of introducing into the lading space only the amount of carbon-dioxide gas found most advantageous for the particular lading carried, or if desired, for excluding the gas from the lading altogether.

Close temperature control is established by means of a thermostatically-operated damper, which controls the circulation of air through the radiators. The bunkers will carry a charge of 3,000 lb. of Dry-Ice, sufficient to refrigerate the car for from 6 to 15 days, depending on other conditions, without re-icing.

Results of Tests

The results during six months continuous operation of this car have been uniformly successful and promising, except for a single run early in the program before the problem of controlling carbon-dioxide concentration had been fully solved. In this run the lading was sold without difficulty in the market despite some coloration due to improper concentrations of carbon dioxide.

In all runs temperature control has been satisfactory. In the best runs, temperatures from top to bottom of the load after the first 10 hours were maintained constant within plus or minus 3 deg. F. for 11 days. In the worst, temperature variations within the load were less than plus or minus 5 deg. F. Temperatures maintained have been adjusted to meet the desires of shippers, and have ranged from +40 deg. F. in a typical unfrozen load to —20 deg F. in an extreme case of frozen-product transportation.

Passing to the second point—that of cost and convenience. Test loads are being hauled for a flat charge of $12.00 per day under refrigeration, with a minimum charge of $48.00, including the necessary Dry-Ice for precooling the car, and providing sufficient margin of safety to allow for reasonable delay in transit.

The development of the use of Dry-Ice in other fields has now extended to the point where these rates can be and are regularly offered to shippers in certain districts at a profit. The rate at which such service may be and will be extended to other districts and still further reduced in price seems to be largely a function of the rate at which the use of Dry-Ice for all purposes increases. The main factor influencing present prices for the product is the small volume it has hitherto been possible to market. The development and introduction of new equipment for using Dry-Ice for *any* purpose is unfortunately a time-consuming process, and the total volume sold in any year is strictly limited by the equipment and methods in actual use to absorb it. Regardless of process, location, idle hopes or other factors, much lower prices are sound only through steady, orderly progress in the introduction of such new equipment and methods.

It is, however, literally true that the volume of solid CO_2 business made possible if 25 per cent of the fruit and vegetable shipments made by members of your association moved under Dry-Ice refrigeration, would make Dry-Ice refrigerator-car costs in some localities strictly competitive with water-ice costs, without claiming credit for advantages due to superior refrigeration or beneficial effect of CO_2 gas.

As to effective control of carbon-dioxide concentrations to obtain maximum benefit and insure against any possible damage from improper concentrations, it will be sufficient to state that the groundwork for the solu-

tion has been laid by the published work of Boyce Thompson Institute, the United States Department of Agriculture, British Food Investigation Board, and others. The DryIce Corporation in co-operation with shippers is making conservative practical experiments on carload test shipments of fruits and vegetables in co-operation with shippers to reduce these results to practice on a commercial scale. Should they prove fully successful, Dry-Ice will be desirable from other points of view than its merit as a source of refrigeration. If not, the method at the worst will have to take its place in the lists in competition with other refrigerating schemes on the basis of its merit as a refrigeration procedure based on cost, convenience, and results.

Introduction of New Methods

As to the sound and conservative introduction of a new method in a field that has made such tremendous forward strides in the past 20 years with the use of a cheap, universally available, and more or less satisfactory refrigerant—water ice—it must be confessed that a dilemma is presented. As is often the case with new developments it appears that Dry-Ice car refrigeration can show advantages for the carriers and car owners only if widely used, and on the other hand will be widely used only if the advantages are first proved.

Nevertheless, a steady and orderly increase in tonnage of Dry-Ice sold annually for purposes entirely foreign to car refrigeration encourages the hope that sufficient volume may yet develop to improve local availability and reduce prices to a more attractive level. No substantial increase in volume sold for car refrigeration, however, can possibly come into being quickly.

In the meantime, it will be the policy of the DryIce Corporation to continue its test program, and to push aggressively the use of these cars only where the merit and fundamental soundness of their use is first proved by test shipments, and at such times and to the extent that all parties directly involved in a given case are convinced that their use will render an improved and dependable service to the shipper at a cost commensurate with the results produced. Railroads have not as yet had any occasion to take any position in regard to the method, but it is to be presumed that they will accept any development which benefits the shipper, and whose introduction is accomplished along sound economic lines without unnecessary attacks upon existing practice where such practices are fully satisfactory.

* * *

Along the Gothard Railway in Switzerland, Near the Village of Giornico

Western Railway Club Talks Air Conditioning

THE regular monthly meeting of the Western Railway Club, held at the Hotel Sherman, Chicago, Monday evening, January 19, was devoted exclusively to a consideration of the subject of air conditioning. President L. R. Wink, Chicago & North Western, introduced C. T. Ripley, chief mechanical engineer of the Atchison, Topeka & Santa Fe, who presided over the meeting. The principal speaker was L. L. Lewis, secretary of the Carrier Engineering Corporation, Newark, N. J., who discussed the effects of air conditioning upon the human system. He said that air conditioning is not new, but was first applied in a large theatre in 1922, and subsequently in theatres, banks, stores, public buildings, and railway equipment. Mr. Lewis maintained that air conditioning has now reached the stage where it may be classified as an art, with a wealth of exact information and data available for the solution of any special installation problems encountered. His paper was illustrated with numerous informative charts and diagrams, shown by means of lantern slides.

Following the principal speaker, F. A. Isaacson, engineer of car construction of the Santa Fe, discussed the application of the Carrier air conditioning system to Santa Fe diner No. 1418 (described beginning on page 362 of the August 23 issue of *Railway Age.*) Mr. Isaacson said that this car has been in regular service since last July without any failure of the air conditioning system and with marked success under the most adverse conditions as regards temperature and humidity. He stated that, in winter, a Vapor system heating unit is placed adjacent to the temporarily non-operated Aerofin cooling coils, and warm air is circulated through the same system which cools the air in summer. The effectiveness of this heating system is such that it is seldom necessary to use the customary side-wall heating coils. On the Santa Fe diner, the air-conditioning system is required for cooling during almost six months of the year and for heating during much of the balance. The system is, therefore, used on practically an all-year-round basis. Provision is made, however, for automatic shutting down of the ammonia compressor and power-consuming equipment when not actually needed, in the interests of economy.

Mr. Isaacson said that the Santa Fe air-conditioned diner was intentionally designed with ample weight and capacity to assure successful and reliable operation of the initial installation, and that substantial savings in weight and cost may be expected in subsequent cars equipped. With the weight and cost suitably reduced, he predicted a general, increased use of air-conditioned equipment. In the course of his remarks, Mr. Isaacson referred to air-conditioned equipment already built or in prospect by the Baltimore & Ohio, the Missouri-Kansas-Texas and the Pullman Company.

A. E. Voigt, car lighting engineer of the Santa Fe, discussed air conditioning from the point of view of maintenance, based on experience with the Santa Fe diner. He said that this car has made 75,752 miles, with a maintenance cost of only $305, as of Jan. 8, 1931. A regular program of cleaning, inspection, tests, adjustments and lubrication has been developed, as outlined by Mr. Voigt, and is largely responsible for the freedom from failure and satisfactory performance of the equipment. Studies of the wear of the gear and pinion drive to the generators indicates a probable life

up to 290,000 miles, but Mr. Voigt said that he believed belt-drive could be used satisfactorily, since the power requirements are least during the winter time when belt-drive usually gives the most trouble. Mr. Voigt said that, up to the present, no air or ammonia leaks have been detected in the system and that it has not been found necessary to re-charge the battery equipment at terminals.

Additional discussion at the meeting indicated that the initial cooling of the Santa Fe car, which has been exposed to excessively high temperatures while standing in coach yards, takes only about 15 minutes and when the car is running through desert country, the ammonia compressor and power-driven equipment are in operation only about 50 to 60 per cent of the time.

Senate Committee Report on Railroad Consolidations

WASHINGTON, D. C.

SENATOR James Couzens, of Michigan, chairman of the Senate committee on interstate commerce, on February 10 furnished one example of a Senatorial investigation carried on without fuss, feathers or hearings, apparently without embarrassment to any one, and also, so far as can be ascertained, without having distracted the attention of any senator to any great extent from other pressing problems. His committee met on that day to learn all about the elaborate study and investigation the committee, or any duly authorized subcommittee thereof, had been authorized and directed to make, by a resolution adopted by the Senate just before its adjournment last year, into the matter of consolidation and unification of railroad properties and the effect of such consolidations and unifications upon the public interest. The committee was to report to the Senate the results of its studies and investigation, including such recommendations for legislation as it deems advisable, and $5,000 was appropriated for the expense of the investigation.

The investigation was carried on by one William C. Green, special counsel for the committee, who prepared a "preliminary" report of 217 printed pages and a nice summary of 44 pages, including three pages of conclusions, further summarized in conclusion No. 21 as follows: "That a study of the records, hearings, and experience of the past ten years does not disclose a situation requiring in the public interest further encouragement of a comprehensive program of consolidation as contemplated by the transportation act. That regulatory legislation should be continued or enacted giving the Interstate Commerce Commission full control of permissable unifications."

Copies of this report were furnished to the committee members for their confidential study so that they might be prepared to consider and possibly vote on the report at the meeting and when they assembled they found the walls of the committee room decorated with large maps illustrating various proposed railway mergers. However, it seemed that none of the senators had had time to read the report, or at least with sufficient intensity to be prepared to discuss it, so the committee talked about a radio bill instead and Chairman Couzens was authorized to release the consolidation report for publication and to have a thousand copies of it printed, which perhaps will suit his purpose, although he emphasized that as it stands it is but the report of the special counsel and must not be taken as representing the views of the committee. Asked when the committee might meet again to consider the matter he said that it had adjourned to meet at the call of the chairman.

A good deal of the edge of the report was taken off by the fact that some one furnished copies of the proposed conclusions written by Mr. Green to certain newspapers which printed them in full while the report was still supposed to be in a confidential state, and before any one knew whether they would also represent the views of any senator except Mr. Couzens. It was assumed that at least they would not make him violently angry. Some of the newspaper stories attempted to inject some interest into the matter by giving the impression that the report was adverse to the four-system plan for grouping the eastern railroads which President Hoover announced some time ago but which has not yet reached the Interstate Commerce Commission in any formal way. The report does include some reference to the latest "four-system" plan of the eastern railroads but says that sufficient time has not been available in which to complete a study of it.

The report consists largely of quotations from various writers who have analyzed the various steps toward railroad unification that have been taken and from the testimony of witnesses at hearings before Congressional committees. It contains a fairly comprehensive review of the history of the subject and analyses of the numerous bills that have been introduced in Congress and even reported on by committees for the purpose of amending and making more workable the provisions of the present consolidation law. It discusses the present law as if its principal and almost only purpose was to take care of weak short lines and expresses the opinion that in view of the opposition of the stronger roads to the acquisition of unprofitable weak roads "there exists no reasonable ground for belief that the weak road problem will be solved by a policy of consolidation." Apparently the policy of the commission in this respect and the agreements made by most of the applicants for authority for unification in the last year or so to take over such lines as the commission shall allocate to them had not been brought to the attention of the author.

Some of the conclusions proposed are that if consolidation legislation is to be continued, provison should be made for the protection of the employees and for the regulation of holding companies and that additional legislation and amendments as to procedure, of the character set out in S. 668, the Fess bill, should be adopted. The Fess bill has been before the committee for a long time since it received any attention.

The report is somewhat handicapped when it comes to the discussion of the effect of the unifications already made as it states that "no conclusion can be drawn from statistics of roads acquired as to effects of consolidation on weak roads because of individual conditions, brief time of operation since acquisition, or because since acquisition separate returns have not been made."

THE NORWEGIAN STATE RAILWAYS are constructing a new railway bridge across the Sarpsfossen, Department of Commerce reports state. The bridge, which will have a total length of 200 meters (656 feet), will consist of three large spans across the water and several smaller spans on shore. The cost is estimated at about 240,000 kroner (about $64,000) and the work is to be completed by May 1, 1931, in view of the new train schedule which will go into effect on May 15. When the structure is completed it will be possible to employ heavier locomotives enabling through express trains to attain a greater speed than heretofore.

Transfers of Lading Reduced

Railways in the Toledo Terminal adopt a consistent policy

By L. C. Reddish,

Secretary, Toledo Association of Railroad Superintendents

The New Maumee Bridge Speeds Interchange

FROM an average of 720 transfers of lading monthly in 1920, the railways entering Toledo, Ohio, have co-operated to reduce this expensive practice, with such good effect that the monthtly average for the first nine months of 1930 was only 42 cars. In September, 1930 a particularly excellent record was made. Of a total interchange of 96,963 loads, the lading of only 23 cars was transferred, or at the rate of one transfer for each 4,216 loaded cars delivered in interchange.

The question of transfer of lading has been one of great importance and concern to Toledo railroads by reason of the heavy interchange of freight cars at that point. Of the 17 steam roads and 4 interurban electric lines interchanging carload traffic through this terminal, all but two, the New York Central and the Pennsylvania (Detroit Branch) terminate here.

With an average monthly interchange of over 100,000 carloads, much of which traffic originates at and is destined to points some distance from Toledo, it is quite natural that the car inspector of the receiving line may expect to find many and varied causes for holding up cars in defective condition; unquestionably he is expected to find every evidence of physical unfitness of a car to continue its journey via his line, and an overcautious or ultra-zealous attitude of such employee might easily result in an excessive, unreasonable or unjustified number of loads being held up.

Such a situation seemed to have arisen after the close of Federal control when the railroads were again being operated by their respective owners, and freight equipment generally was not in good physical condition. Confronted with not only the initial expense of transfer, but also with the subsequent expense arising through claims, dissatisfied shippers, etc., the need for sound and sane corrective measures was recognized and action was accordingly taken by the mechanical department representatives, through the Toledo Association of Car Interchange Inspection, and by the operating department representatives, through the Toledo Association of Railroad Superintendents. The results obtained are clearly shown by the foregoing table.

Transfer Records, 1920-1930

Year	Average No. loads delivered in interchange per mo.	Average No. loads transferred per mo.	No. loads transferred per 1,000 loads interchanged
1920	Records not available (7 Mo. only)	720	...
1921	Records not available	632	...
1922	Records not available	546	...
1923	104482 (8 Mo. only)	720	6.89
1924	99493	391	3.93
1925	109302	178	1.63
1926	Records not available	151	...
1927	117903	117	.99
1928	117255	99	.84
1929	123568	86	.69
1930	101815 (9 Mo. only)	42	.41

How It Was Done

In explaining the steps taken to eliminate all unnecessary transfers, it should first be understood that the Toledo Association of Car Interchange Inspection, consisting of a representative of the mechanical department of each road, functions through the paid services of a chief interchange inspector with necessary assistants and office force. This organization supervises, under mechanical rules, all service having to do with the inspection, repair, transfer, etc., of cars. One of the rules of the association is that the receiving line cannot charge the delivering line for transfer of lading unless such action is authorized by a transfer order issued by the chief interchange inspector.

Monthly statements were rendered by the superintendents' association showing the number of transfer orders issued to and against each road. With the details thus brought in comparative form to the attention of the supervisory officers of both departments, added interest and increased supervision were promoted. The chief interchange inspector became more exacting and less liberal in the issuance of transfer orders; some time later the interchange association authorized the appointment of a rotating committee of three, which would eventually involve the service of each member of the association, whose duty it was occasionally to visit the yards of all member roads to view the cars held for transfer or repair and to pass upon the judgment of the chief interchange inspector or his assistants in issuing or denying transfer orders. The policy thus established and practiced on each road was:

First: Run the car if safe to do so, consideration being given to the nature of the defect and to the distance the car had to move to reach destination, the matter of safety being the governing factor.

Second: Repair under load if possible. Whenever possible, if the car belonged to a Toledo road and repair parts were needed from the car owner, they were obtained by truck with the least possible delay. If neither the first nor second provisions could be complied with, then action was taken to
Third: Transfer the lading.

The Fixed Charge

There was also another feature which was helpful in this campaign to reduce the transfers of lading. For many years prior to 1917, a schedule of prices for transferring various commodities was in effect at this terminal, charges being principally at a per ton rate, with a few exceptions wherein actual cost or other bases of charge were provided. During the latter part of 1917, two roads withdrew from the agreed schedule of rates because of their inability to obtain labor to perform the service, and entered into contract with an outside firm for this work at a flat rate per car, their charge against the connecting lines thereafter being at the rate paid the contractor. This action was soon followed by other roads, resulting eventually in the general adoption of the flat per car rate.

This seemed to prove generally satisfactory. No monetary gain accrued to the transferring line; hence there was no incentive to transfer cars unnecessarily. It is admitted that certain commodities cost more than others to transfer, but we found that there was not sufficient disparity between the high and low cost commodities on any one road to affect the situation materially; furthermore, the rate per car paid to the contractor was based largely upon the general experience rather than that of any one line. No incentive could exist for any road to pay a contractor an exorbitant rate for such service, as it would only react by establishing a high cost to itself through cars transferred for it by connecting lines. Furthermore, the contractors' force, being more mobile than any railroad transfer crew, could be moved from one road to another to meet the particular need of any road by which he might be engaged.

The agreed charge per car ranged from $8 to $13 and has been changed eight times during the past 11 years, indicating a tendency to keep it in line with actual costs. The present flat rate of $10 per car has been continued in effect for several years. This rate does not cover any material which it may be necessary to use in order to protect the transferred load properly, the cost thereof being in addition to the flat rate. It is also provided that, where lading is such that the use of an electric crane or steam derrick is necessary, an additional charge of $3 per hour for the use and operation of such facilities is permitted.

While it is admitted that the retirement of old equipment, the placing in service of many new cars and a better general condition of all equipment in operation has helped materially in the reduction of transfers of lading, it is the positive conviction of all railroad officers at this terminal that the persistent and conscientious application of the policies and practices described has brought about the present highly satisfactory condition.

DEPARTMENT OF COMMERCE reports state that a recent royal order requires Spanish railroads to hold merchandise at the disposal of consignees for a period of 20 days after the date of notice of arrival. If the goods are not claimed within that period of time, the railroads are required to inform the Chamber of Commerce having jurisdiction in the region concerned, and, if the merchandise is not withdrawn within an additional 20-day period, the companies may then proceed to sell it at public auction.

The Railroads Will Win Through

(Continued from page 357)

being more carefully and thoroughly scrutinized today than ever before. Notwithstanding all we see and hear about pipe lines and their competition with the rail lines, I am convinced that for the vast bulk of American industry's output, the railroads will continue to be the producer of low cost transportation and the carrier of their materials and finished products.

The consolidation plan represents an effort to solve a great national question. It should be viewed as a whole as serving the public interest as a whole and for that reason obviously no detailed comment upon it can be properly made until the plan in all its details is perfected and submitted as it will be in due time to the Commission.

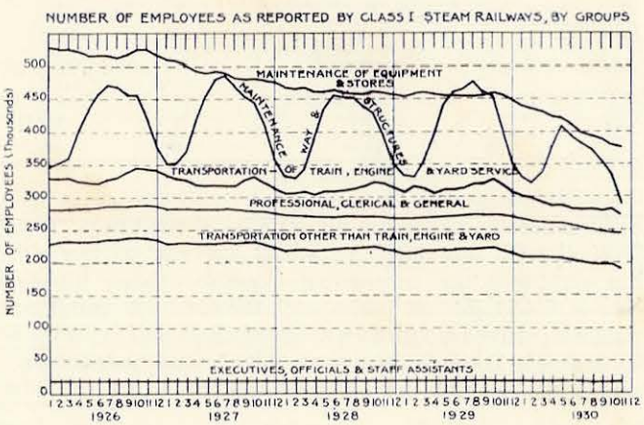
There is no real basis for any other view of the railroad outlook than a constructive one. Naturally we have felt the effects of the falling off in business, but it must have become evident to you that in the last half dozen years the railroads have effected a remarkable control over their expenses in relation to their revenues. Naturally, too, we have lost some business to competing forms of transportation. But if we are alert to the public's requirements, as I believe we are, and if our inventive genius remains active, as I know it to be, these situations hold no serious menace. Even the political handicaps under which railroads have always operated are less serious now than they used to be. Our regulatory authorities reflect a wholesome desire to encourage sound economic advances in the art of transportation. In short, the railroads are looking forward with justified confidence not only in themselves, but also in the future of the country and their own indispensable part in its progress.

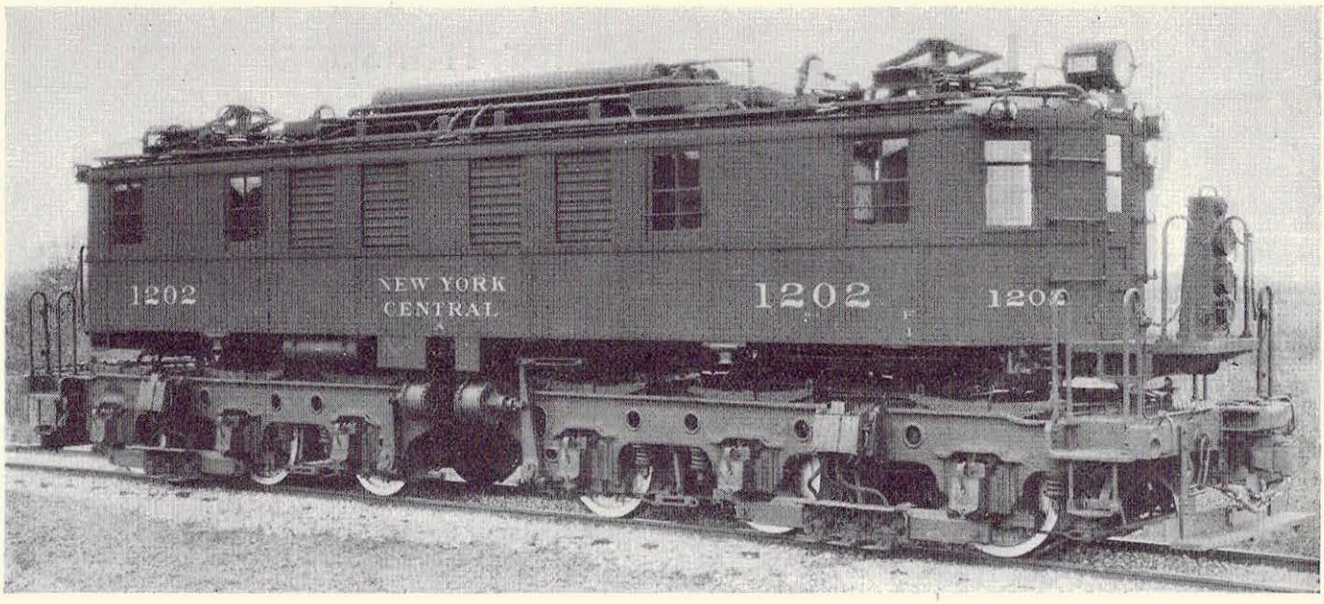
Wage Statistics

WASHINGTON, D. C.

CLASS I railways reported to the Interstate Commerce Commission a total of 1,394,401, employees as of the middle of the month of November, a decrease of over 60,000 as compared with October and of 286,626, or 17.05 per cent, as compared with November, 1929. The total compensation for the month was $193,932,498, a decrease of 19.46 per cent.

In connection with its monthly statement of wage statistics the commission published the following chart showing the fluctuation of railway employment during the past five years, which illustrates graphically the sharp reduction in maintenance of way and structures work in 1930:





Straight-Electric Locomotive for Use in and Near New York City

New York Central to Use

Forty-Two Electric Locomotives

for West Side Improvement

Units are arranged for multiple-unit operation and will occasionally be used in passenger service

By F. H. Brehob

Locomotive Division, General Electric Company

THE General Electric Company has started delivery of a group of forty-two electric locomotives for the New York Central Railroad, weighing 133 tons each, for combined freight and passenger service. While these locomotives are essentially freight locomotives for use in conjunction with the New York City "West Side" improvement, they are also suitable for passenger service and will be used as such occasionally.

Cab and Running Gear

The locomotives are built with box-type cabs, arranged with an operating compartment at each end and an apparatus compartment between the two. In the middle of the apparatus compartment is a separate compartment which houses the contactors and other control apparatus, separating this equipment from compressors and blowers.

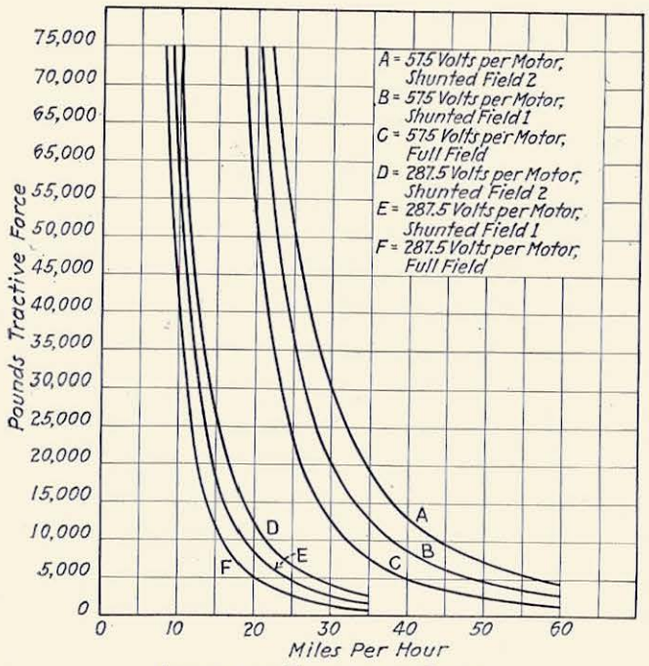
The running gear consists of two three-axle trucks with integral cast steel frames. In order to make the trucks suitable for the length of cab involved, they are separated by means of a drawbar, with a ball and socket joint at each end. This arrangement, in order to produce suitable riding characteristics, employs a lateral restraint device operating in conjunction with rockers and springs to provide the necessary resistance for proper running. The trucks are side-equalized and cross-equalized by means of a spring system with semi-eliptic springs located above the journal boxes and coil springs at the end of the equalization system. In addition quiver springs are provided over the journal boxes to improve riding qualities.

Equipment

Six GE-286 motors, having a combined rating per locomotive of 2500 h.p. hourly and a continuous rating of 2025 h.p., are used. These motors are equipped with the new constant oil level bearings, allowing infrequent oiling, yet maintaining the oil in the waste chamber at the proper level. They are geared to the driving axles by means of cushion gearing with a 69/20 ratio. These motors give the locomotives a one-hour rating of 41,800 lb. tractive force at 22 m.p.h., and 31,620 lb. tractive force at 24 m.p.h. continuous. The maximum tractive force for starting is 66,500 lb.

There are two traction motor blower sets, the control of which is such that they may be operated either in multiple for maximum ventilation or in series when maximum ventilation is not required, controlled by the engineman at his operating position. In addition, the air ducts are arranged so that all six traction motors may be ventilated by one blower set in an emergency in case the other blower set is inoperative.

Two, two-stage air compressors having a combined



Locomotive Characteristic Curves

displacement of 240 cu. ft. per minute provide the necessary air for the air brakes and air signal equipment, at a pressure of 140 lb. for use with 110-lb. brake pipe when the locomotives are used in passenger service.

A 14-EL air brake and air signal equipment is provided. These locomotives are the first to use a new brake valve pedestal fitted with a pipe bracket near the base which is convenient when replacing brake valves. The feed valves, cutout and dead-engine cock are directly attached to this pedestal, thus simplifying the piping.

The control equipment is of the electro-pneumatic type and arranged for multiple-unit operation of the locomotives. The control is arranged for two running speeds, in the full field connection of the motors; that is, two motors in series on 600 volts and all six motors in multiple on 600 volts. In addition there are two reduced field running positions for each motor combination making six running combinations in all.

A high-speed circuit breaker is provided for the protection of the traction motors. In addition the third rail shoe fuse boxes are supplied with pneumatically-operated fuse cutters with the control brought to the engineman's position and operated from either end of the locomotive to rupture the fuses in case of trouble when insufficient current is flowing to blow the fuses. Two current collectors are provided for each locomotive to collect current from overhead rails. The railroad company found it necessary to change the height of the overhead rail on the "West Side" tracks making it necessary to provide a two-range overhead shoe for operation on either high rail or low rail, the proper operating height being selected by means of a sealed valve.

A 16-cell lead-type storage battery is provided for control and lights. This is charged in series with the blowers and a portion of the electric heaters to insure ample charge. Overcharging is prevented by means of a carbon-pile regulator shunting the current not required by the battery.

The speed-tractive force curve shows the locomotive characteristics in the various running positions. It will haul a 2250-ton train at 32 m.p.h. on level tangent track. Two or three locomotives can be operated in multiple-unit to handle heavier trains. The maximum rated speed is 60 m.p.h.

Motor Transport Hearing at Los Angeles

OPERATORS of common carrier motor truck lines joined with witnesses for several railways in recommending regulation of interstate motor coach and truck operations at the Interstate Commerce Commission hearing in Docket 23,400, Co-ordination of Motor Transportation, in Los Angeles, Cal., on February 2. The hearing was conducted by Examiner Leo J. Flynn, who was assisted by Examiner Albert E. Stephan.

J. B. Duffy, assistant passenger traffic manager of the Atchison, Topeka & Santa Fe, Coast Lines, testified that the number of passengers handled by the Santa Fe decreased from 15,656,333 in 1920 to 4,253,695 in 1929, passenger revenues declining from $63,473,165 to $37,926,205. Part of the diversion of passengers from the railways has been due to the increasing use of private automobiles, according to Mr. Duffy. Motor coaches handle as much as 50 per cent of the passenger traffic moving over the highways on some routes and as low as 15 per cent on others, 25 per cent being a fair average in the Western territory. Efforts to meet motor coach competition by reducing railway fares have produced unsatisfactory results, according to Mr. Duffy, since, with the advantage of low operating costs, the highway operators are able to reduce their rates to or below the lowest fares the railroads are able to fix. Mr. Duffy said that in some instances where rail and highway fares are equal, the motor coach companies attract the larger volume of traffic, indicating a preference on the part of some travelers for motor coach service. He added that this condition does not apply to travel between distant points, nor generally throughout the Western territory, but only on short trips through scenic territory where paved roads are available. Mr. Duffy testified that the Santa Fe does not operate any motor coaches. Government regulation of interstate carriers of all kinds and more stringent regulation of intrastate motor carriers are imperative, Mr. Duffy said, and desirable for the benefit of the public and the transportation industry.

W. T. Quirk, assistant to the general manager of the Santa Fe Coast Lines, was the next Santa Fe witness. He testified that this road is employing rail motor car equipment on many of its shorter lines, reducing the cost of operation from 80 cents to 45 cents per train mile. C. L. Seagraves, general colonization agent of the Santa Fe, testified that "wild-cat" automobiles as well as motor coaches are attracting passenger traffic from the railways. He cited instances of automobile operators charging a fare as low as $6 for the 485-mile trip between San Francisco and Los Angeles. The declining passenger traffic of the railways on the Pacific Coast has occurred in spite of the heavy increase of population in that territory, according to Mr. Seagraves. The Coast Lines of the Santa Fe sold 1,086,706 tickets in 1921, collecting $3,935,261 in revenue. In 1929, 622,249 tickets were sold, with a revenue of $2,306,809, a decrease in revenue of $1,628,452, or 41.38 per cent.

Trucks Work With Steamship Lines

Berne Levy, assistant general freight agent of the Santa Fe, Coast Lines, submitted an exhaustive analysis

(*Continued on page 376*)

A Letter From the New Haven

In which the chief purchasing officer criticizes our reports of the I. C. C. investigation of the purchasing practices of that road

By C. E. Smith

Vice-president, New York, New Haven & Hartford, New Haven, Conn.

(The *Railway Age* has always subscribed to the policy of fair play in publishing railway news and comment in its columns. In harmony with that policy, it has never refused to publish a letter of criticism. It is in accord with this policy that the following letter is published.—EDITOR.)

SO many expressions of astonishment and indignation have come to me concerning the article in the *Railway Age* of December 13, 1930, concerning the relation between purchases and traffic on the New York, New Haven & Hartford that I have felt compelled to point out inaccuracies that make the article unfair to the New Haven and those with whom it deals, and, unless corrected, will have a far-reaching influence in breaking down the good-will that all railroads have built up by ten years of exceptional improvement in service.

The New Haven welcomes every visit of government officers and relishes the opportunity thus afforded to show how the New Haven has accomplished such amazing betterment. We also do our best to co-operate with the press properly to present the railway picture.

If the means by which we have accomplished good results will help others to do likewise, we are glad. If the means by which others accomplish good results help us, we are grateful. If the means used by us or others are not proper from every standpoint, we want to be the first to know it so that necessary corrections can be applied.

But, in this process we expect the same fair play that we extend to all with whom we deal. Mr. Elisha Lee has said* that the railroads have been docilely taking it on the chin too long, and should do so no longer. There is some chance to defend ourselves against blows on the chin, whether delivered accidently or maliciously, but there is no adequate defense against an unexpected blow below the belt in the house of our friends.

Purchasing Efficient

It has been my experience that railroad purchasing is conducted most efficiently, that the purchasing officers are striving continually for goods of better quality and for lower prices, and that they are but little affected by traffic influences of personal friendships. The same can be said for the railway supply industry as a whole. I have found it clean and well conducted along sound business lines.

But, purchasing officers should be like Caesar's wife —above reproach. They must not only be honest; they must be believed to be honest. All who have the welfare of the railroads at heart should try to paint the picture that railroad purchasing is more than 99.9 per cent sound and not make mountains out of the molehills of apparent departures from the general rule.

* *Railway Age*, November 29, 1930.

Before reading our files, the investigators for the I. C. C. told me they were assembling information to show the extent to which purchases and traffic are related, that they were going to make a complete investigation on only a few roads and that they would follow up certain subjects on others. The roads on which complete investigations were made were chosen as key roads in different parts of the country and not because of any prior knowledge or suspicion that their purchasing and traffic policies were different from those of other roads. The New Haven was chosen as the leading railroad in New England. No study was made of the others.

Selected Letters Not Representative

We were only too glad to open our files to the investigators for the I. C. C. Four of them were given a room in our purchasing department where, for a period of three months, they read our purchasing and traffic department files extending back five years and copied all the letters they could find relating to purchases and traffic, amounting in all to slightly over 2,000, including related letters, many of which do not mention traffic. At first thought, that is a lot of letters. Assembled, they make an imposing file. But they are a drop in the bucket when it is known that during the period covered by those letters the purchasing department of the New Haven received 1,000,000 letters, sent 500,000 letters, received 200,000 requisitions for 1,000,000 items and checked and vouchered for payment 500,000 invoices. In addition, the traffic department handled considerable correspondence during that period. Considering that the traffic representatives of the railroad meet the manufacturers' representatives all over the country, it is surprising that there have not been more references to purchasing and traffic.

The traffic question originates in the following way: Our traffic representative solicits the routing of freight over the New Haven. The traffic manager of the manufacturer counters with: "Why should we ship anything over the New Haven? You don't buy anything from us." The railroad traffic man replies: "I'll take the matter up with the purchasing department." It is then passed along to us. All of it is the language of diplomacy—sales talk, not to be taken too seriously, but to be handled courteously. In this exchange of pleasantries, forceful executives, supersalesmen, men of prominence in industry, sometimes take part and the files contain some more interesting high lights, which, in the hands of one who is trying to write a sensational story, can be so used as to create impressions contrary to the facts. That accounts for the article in the *Railway Age* on December 13. Some of the matters referred to in that article were not inquired into by the I. C. C. attorney, apparently because he was satisfied with the showing.

Hearings were held at New Haven, Conn., on December 2 and 3 and at New York on December 12. At New Haven, B. Campbell, retired traffic vice-president, C. R. Painter, purchasing agent, and the writer testified. No fault can be found with the report of that testimony appearing in the *Railway Age* of December 6.

Before the end of the New Haven hearing, the I. C. C. attorney presented as exhibits bundles of the letters copied from our files and copies were furnished reporters and any others who asked for them. The hearing adjourned at noon December 3 to be resumed at New York December 12. In the meantime, the reporter used these letters as the basis of the *Railway Age* article of December 13, ignoring testimony given December 2 and 3, and, not waiting for the testimony on December 12, made so many mistakes and misstatements and told so many half-truths as to make the article most unfair and misleading. The only way to correct so many false statements is to point them out and state the correct facts, which I will try to do in the following: (Paragraphs in smaller type are those quoted from the *Railway Age*.)

The record was replete with instances of traffic embargoes and boycotts by large and small firms disappointed in purchases.

Nothing could be further from the facts disclosed. This statement is contrary to the evidence. The letters showed relatively few instances where manufacturers stated they could give the New Haven more or less freight, depending upon the amount of its purchases.

It also showed the growth of reciprocity as a policy of the road, under which the purchasing department, at the instance of the traffic department or upon its own initiative, engaged vigorously in trading purchases for the competitive traffic of offline firms, in many cases withdrawing purchases from concerns which refused to report their traffic to the purchasing department.

This statement is not true. The record shows that purchases were not traded for competitive traffic, nor has there been a single instance in which purchases were withdrawn from concerns which refused to report their traffic to the purchasing department.

Electrical Tonnage

I should like to call attention to another statement in the *Railway Age*:

Subsequently the road began to get reports on the electric firms' tonnage and it was understood from the testimony of C. E. Smith, present vice-president of the road, that it was the desire to bring about a more favorable relation between the relative traffic from, and the purchases from, the leading electrical firms which dominated in the recent purchase of certain traction equipment.

These statements are not true. My testimony on this point reads as follows: "We never buy anything for any department of the railroad that either they or we do not know will be just as good as something else they call for. For example, there are some people on our railroad who would prefer and honestly prefer goods manufactured by ————. We think we know that similar goods manufactured by the ———— Company are just as good. We prefer in the purchasing department to get competitive prices than to merely place orders with the one company specified by the user."

There is not one word in the record that the railroad subsequently received reports on electric firms' tonnage. We do not insist on such reports, nor do all electric companies furnish them, and we have never had any definite figures on their relative tonnage. The "relation between the relative traffic from, and the purchases from, the leading electrical firms" was not the dominating factor in the recent purchase of certain traction equipment, although that was discussed. Of the most recent large purchases, one was placed with one company because of the lower prices on the same equipment, the other with another company because of its offering a larger machine for the money.

The report published in the *Railway Age* of December 13 also contained the following statement:

Also, in January, 1929, the new vice-president of purchasing, C. E. Smith, at the request of the traffic department, wrote to the corporation's manager of sales at Boston regarding coal purchased from the Pennsylvania Coal & Coke Co., for the American Steel & Wire Co., and succeeded in securing a portion of that traffic for the New Haven "in view of our present relations."

Correspondence referred to was conducted by the late vice-president, N. M. Rice, and not by me. The correspondence showed that the American Steel & Wire Co. expressed regret that they could not change their routing of the coal, and the vice-president of the railroad did not succeed in securing a portion of that traffic.

Paint Purchasing

In 1926, the Sherwin-Williams Company was "witholding all possible competitive tonnage from the New Haven" because the road was not purchasing "sufficient quantities" of paint from it and was determined to adhere to the "penalizing policy" of several years' duration until it got paint orders. Mr. Rice wrote that the company always got bids and failed to secure more orders because its quotations were excessive. The paint purchases increased from $900 in 1928 to $4,732 in 1929. In April, 1929, the company was "much pleased" and the "gate was unlocked," and Sherwin-Williams continued to figure prominently in the division of paint purchases, as reflected by the correspondence.

The records show the withholding of traffic was more of a sales argument than an actual fact. The Sherwin-Williams Company has not "continued to figure prominently in the division of paint purchases," but has continued to complain of our small purchases while it continues to give the New Haven several times the amount of traffic given us by other companies that sell the New Haven many times the amount of paint sold by Sherwin-Williams, which is one of the good losers referred to in my testimony of December 2.

In 1928, the traffic department failed to get competitive automobile tonnage from Willys-Overland Company and appealed to the purchasing department with the announcement of the auto maker that the road was not buying supplies from the Mountain Varnish & Color Works, a subsidiary. There were over a hundred letters in the record on that subject. ——etc.——. The paint company got over $5,000 worth of orders during 1929 but the traffic department was not satisfied with the traffic, finding that it was largely non-competitive business.

It must be apparent that $5,000 is a very small part of the paint we buy in a year and it hardly pays the salesman who follows our inquiries. The publishing of this reference is most unfair and damaging to the Mountain company. Many reports of unsatisfactory service, when followed up, are found to be incorrect, failures are not substantiated or are due to improper application, used for other purposes than that to which the paint is adapted, or other causes.

Further study has shown that the products of the Mountain company are satisfactory to us and we are glad to get them when their prices are low—compared with goods of equal quality. Notwithstanding the above mentioned traffic connection, however, only a very small part of our paints is purchased from the Mountain company.

It also showed the extent to which the purchasing department demanded the shipment of materials in New Haven equipment, prevailed on the beneficiaries of orders to buy supplies from patrons of the New Haven and bargained on behalf of the Pennsylvania as well as itself for the traffic that bidders indirectly controlled or could influence.

The shipment of materials in New Haven equipment is quite remote from reciprocity. It is insisted on to a reasonable extent in the interest of car economy to secure return loads for New Haven cars made empty in the vicinity of shippers of our supplies. In the case of coal, we ship our cars to the mines in order to avoid having coal, stored in cars on our lines, stand around in foreign equipment. This seems to be complying with the statutory provision for economical and efficient management.

Coal Traffic

The New Haven has not bargained on behalf of the Pennsylvania for traffic as the Pennsylvania is well able to bargain for its own traffic. In soliciting traffic for the New Haven, our connections and through routes to the west and south, including the Pennsylvania as well as other lines, are emphasized to the limit. It is unfair to suggest that the New Haven bargains on behalf of the Pennsylvania only.

During this testiomny, C. E. Smith deplored the thought of denying the shipper the right to route his traffic and the examiner asked if that was not already being done by the New Haven.

The examiner did not ask if the New Haven was not denying the shipper the right to route his traffic. He asked if the New Haven was not already routing traffic which was unrouted by the shipper. There is a considerable difference.

There were over 1,000 letters produced in the hearings regarding coal buying on the New Haven. Most of them dealt with the interest of the Pennsylvania in the purchase and movement of the New Haven's coal.

Most of these letters did not deal with the interest of the Pennsylvania in the purchase and movement of the New Haven's coal, in regard to which there were some letters from the Pennsylvania and some from other railroads equally interested in hauling New Haven coal.

Last year the fuel agent of the New Haven informed President Pelley that he could not recommend purchases from the Continental Coal Co. for 1930. The coal was developing too much ash when burnt. It was one of the "largest and most reliable producers in the East" and was also known as the company of Edward Hines, president of the Edward Hines Lumber Company. President Pelley received a telegram from Edward Hines and it was explained by Mr. Hines and the coal operator that the trouble could be overcome by screening improvements. This would increase the cost of the coal five cents a ton but "could be absorbed if the coal company could sell direct to the road instead of through wholesalers." "Of course," said Mr. Hines in his telegram, "I will take a personal interest in any business we may have with your road"; and the fuel agent, writing on the subject, said: "From a recent talk.....I have every reason to believe Mr. Hines, through his wood products, will give us business from time to time." The record showed that the coal company has contracted to supply a minimum of 200,000 tons of coal for the New Haven during 1930—50,000 tons direct and 50,000 tons through each of the three wholesalers named above.

This relates to the efforts of the New Haven to get a satisfactory locomotive coal by prevailing upon the coal company to screen out objectionable dust and slack, which was agreed to and a satisfactory coal delivered at the same price as other coals from the district. There is no record, nor is there any knowledge, that the Edward Hines Lumber Company ships any traffic over the New Haven, and the Continental Coal Company ships practically no coal traffic over the New Haven. This coal has been purchased solely on quality and price. On this point, the traffic department advised on April 30, 1930, in reply to my inquiry, that the Hines Lumber Company ships practically nothing into New England and is of no value to the New Haven from a traffic standpoint; also that the Continental Coal Company shipped only 32 cars of commercial coal over the New Haven in 1929.

The correspondence with the Pennsylvania relative to coal buying revolved chiefly around the fact that the road's coal supply is obtained in off-line territory. When C. E. Smith testified last week as to the relatively low average prices paid by the road this year for its fuel, he was referring to the prices at the mines. In contrast with $1,816,000 paid to the coal producers in 1929, however, the road also paid $3,212,000 to bring the coal to its line. The Pennsylvania sought the haul on this coal.

The testimony showed that all intervening railroads sought the haul on this coal, not alone the Pennsylvania. My testimony on this was as follows:

"We have never been offered any better price. In fact, I might say at this point that I do not know how to get a better price. The *Railway Age* published a statement for the first six months of this year showing that the New Haven buys its coal cheaper than any railroad in this country except a little Utah railroad of 111 miles."

Another objectionable statement in the *Railway Age* of December 13 was as follows:

Early in 1929 spot orders were placed with the Keystone Company and contracts subsequently arranged calling for a minimum of 300,000 tons from that concern. The price was $1.28 per ton at the mine as compared with $1.15 paid to all other producers.

The Keystone Coal & Coke Co., the letters showed, promised to influence all the traffic they could for the benefit of the New Haven in return for its contracts placed with it and was given to understand that the road would be willing to give it credit on a two for one basis for every car that was moved over the line and switched to a connecting line for delivery.

The plain inference in this statement and the context is that the New Haven paid 13 cents a ton more for coal from a mine on the Pennsylvania than for other coal in order that that railroad might haul the coal. That is not correst.

Testimony in this case, and letters in the file, show that up to 1929 mines on the Pennsylvania asked more for their coal than the New Haven could buy coal for elsewhere. In bids taken in the summer of 1929 under the Clayton Act, which were advertised in the press, open to everybody and opened in public, the Keystone Company was the lowest bidder on satisfactory coal. Copies of all bids were furnished all bidders, were published in the coal trade papers at the time and were filed with the Interstate Commerce Commission. The price was $1.25 per net ton for 200,000 tons of coal, and $1.15 was the best price that could be secured for coals in the Westmoreland district, taking a 15 cent gross ton (13 cents net ton) higher freight rate, equivalent to $1.28 per ton compared to the Keystone coal in the Greensburg district. Considerably elated at getting such a low price for Keystone coal, and notwithstanding that Keystone ships very little, if any, coal over the New Haven, the railroad accepted the low bid of $1.25 and had no hesitancy in contracting for 100,000 more tons of Keystone coal at $1.28. It did not buy 300,000 tons at $1.28. It could not have bought 100,000 more tons at $1.25. The price of $1.28 per ton is not comparable with the price of $1.15 per ton because they come out of different freight rate districts, one of which is approximately 50 miles farther from the New Haven than the other, and 13 cents more is charged on account of the extra distance.

Differentials, going up and down with changes in freight rates, have existed between those three districts and all New England points by New Haven, New York Central and Boston & Maine gateways on all coal, commercial as well as railroad, farther back than anyone in our organization could discover.

The record of December 2 also showed that the Pennsylvania has neither directly nor indirectly brought any pressure to bear on the purchasing or routing policies of the New Haven and that it merely works for

and gets a portion of the New Haven freight somewhat proportional to its proportion of connecting line freight, just as do the representatives of other connecting railroads work for and get a portion of the New Haven traffic.

Fuel Policies

The correspondence showed that the argument of the fuel agent prevailed to the extent of restricting the purchasing through brokers to 50 per cent of the total requirements, and the proposal to designate in all contracts with brokers the specific mines from which the coal should be obtained and make the mine operator a party to the contract also prevailed, but, otherwise, the reciprocity program prevailed.

This is not the policy of the New Haven but was merely a suggestion of the former fuel agent. The New Haven does not buy 50 per cent of its coal from brokers and 50 per cent from operators, but purchases all its coal from regularly-accredited sales agencies of mine-operating companies. It has been the practice for many years to have our coal contracts signed by the operating company in order to make sure that the broker or wholesaler is properly accredited to sign the contract for the particular coal contracted for.

Our Reply

Mr. Smith found no fault with the report published in the *Railway Age* of December 6. His criticisms are directed to the reports in the *Railway Age* of December 13 and are based chiefly upon the references made to letters which the investigators of the commission selected from the road's files. While, as Mr. Smith has stated, these letters were not all testified to by the witnesses, they are as much a part of the record of the investigation as the testimony of New Haven officers.

The comments of Mr. Smith regarding the efficiency and honesty of railway purchasing officers and the railway industry, and particularly the information he supplies that the number of letters used by the government was insignificant in comparison to the aggregate of the New Haven purchasing correspondence during the same period and are not representative of routine purchasing, are interesting and deserving of the emphasis Mr. Smith has given them, but they were not a part of the hearing and, for that reason, could not be referred to in the *Railway Age* report of that hearing. By reason of the pressure under which our editor was working and the extraordinary volume and rapidity with which much of the evidence was introduced at these hearings, he was in error in certain statements. It should also be said that after considering additional information which Mr. Smith has since submitted but which was not a part of the record, certain phases of the article would not now be treated in the way in which they were treated. At the same time, it is believed that, on other points, the record substantiates the statements.

Wabash Operates 4-8-4 Types in Freight Service

TWENTY-FIVE 4-8-4 locomotives were recently placed in through-freight service by the Wabash between Decatur, Ill., and Montpelier, Ohio, a distance of 272 miles, with eastbound and westbound ruling grades of 0.6 and 0.9, respectively. These locomotives, which were built by the Baldwin Locomotive Works, were purchased to replace 4-8-2 type locomotives developing a tractive force of 66,568 lb., a description of which was published in the April 5, 1930, issue of the *Railway Age*, page 821. The 4-8-4 type locomotives develop a tractive force of 70,817 lb.

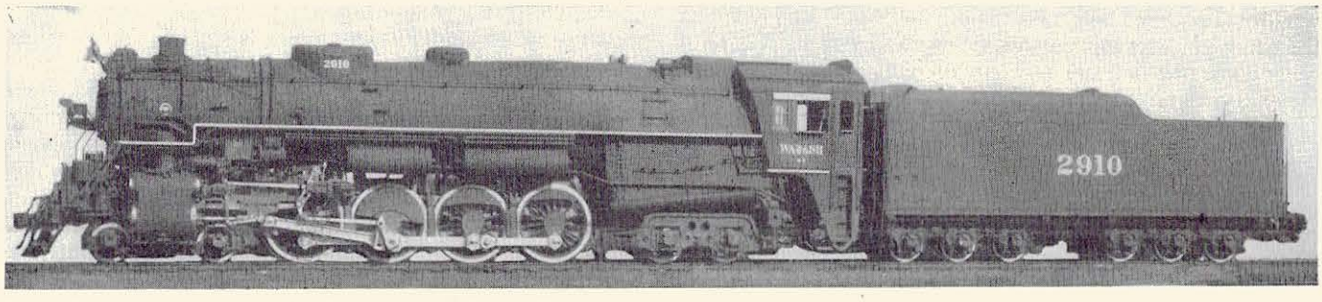
The new power is somewhat similar in design to the 4-8-2 type except that the four-wheel trailing truck permitted the utilization of larger grate area—96.2 sq. ft.—than could be carried on a two-wheel trailing truck.

Principal Dimensions and Weights of the Wabash 4-8-4 Type Freight Locomotives

Railroad	Wabash
Builder	Baldwin Locomotive Works
Type	4-8-4
Service	Freight
Rated maximum tractive force	70,817 lb.
Weight on drivers ÷ maximum tractive force	3.87
Cylinders, diameter and stroke	27 in. by 32 in.
Valve gear, type	{Walschaert (20) {Baker (5)
Weights in working order:	
On drivers	274,100 lb.
On front truck	78,590 lb.
On trailing truck	101,400 lb.
Total engine	454,090 lb.
Total engine and tender	750,600 lb.
Wheel bases:	
Driving	18 ft. 3 in.
Total engine	45 ft. 0 in.
Total engine and tender	86 ft. 10 in.
Wheels, diameter outside tires:	
Driving	70 in.
Front truck	33 in.
Trailing truck	42½ in.
Boiler:	
Steam pressure	250 lb.
Fuel, kind	Soft coal
Diameter, first ring, inside	86½ in.
Firebox, length and width	144 in. by 96¼ in.
Tubes, number and diameter	49—2¼
Flues, number and diameter	214—3½ in.
Length over tube sheets	21 ft.
Grate area	96.2 sq. ft.
Heating surfaces:	
Firebox and combustion chamber	369 sq. ft.
Arch tubes	30 sq. ft.
Thermic syphons	96 sq. ft.
Tubes and flues	4,689 sq. ft.
Total evaporative	5,184 sq. ft.
Superheating	2,360 sq. ft.
Combined evaporative and superheat	7,544 sq. ft.
Tender:	
Water capacity	15,000 gal.
Fuel capacity	18 tons

These locomotives operate at a boiler pressure of 250 lb. The driving wheels are 70 in. in diameter and the cylinders are 27 in. in diameter by 32 in. stroke. Other dimensions, weights and proportions are shown in the table.

The principal differences in design between the new



Wabash 4-8-4 Type Locomotive Built by the Baldwin Locomotive Works

power, which has been designated by the Wabash as Class O-1, and the 4-8-2 types is primarily in the boiler and firebox. The steam pressure has been increased from 235 lb. to 250 lb. The grate area was increased from 84.2 sq. ft. to 96.2 sq. ft. The length over the tube sheets has been increased from 20 ft. to 21 ft., while the total evaporative surface has been increased from 4,620 sq. ft. to 5,184 sq. ft. The superheating surface of the 4-8-2 type locomotives was 2,004 sq. ft. This has been increased in the 4-8-4 type to 2,360 sq. ft., making a combined evaporative and superheating surface of 7,544 sq. ft. for the 4-8-4 type as compared with 6,626 sq. ft. for the 4-8-2 type.

The tenders are of rectangular construction with a capacity for 18 tons of coal and 15,000 gal. of water. They are carried on two six-wheel cast-steel trucks having 36-in. wheels with 6-in. by 11-in. journals. Copper-bearing steel is used in the construction of the tank. The fuel and water capacity of the tenders for the new locomotives is the same as that of the tenders used behind the 4-8-2 type locomotives.

Noted Economist Defends Railways

DR. ROYAL MEEKER, the well-known economist, formerly a professor at Princeton University and, later, U. S. Commissioner of Labor Statistics and Secretary of Labor and Industry of Pennsylvania, has come to the defense of the railways in their struggle with unjustifiable and uneconomic competition. In a recent copyrighted article written by him and released by Professor Irving Fisher's economic service, he vigorously attacks the legislative situation which permits a subsidy to waterway and highway transport, a large part of the expense of which is defrayed by the taxpayers. He advocates also the co-ordination of all forms of transportation into a harmonious, non-competitive system. Extracts from his article are as follows:

"The fact that rates charged by inland water carriers are nearly always much less than rail rates between the same points is cited to prove that water transportation is cheaper. Most people are fooled by this innocent statement. The truth is that shippers by inland waterways pay only a fraction of the total costs of transportation, varying from about one-third on the Mississippi and Ohio River Systems to less than one-fourth on the New York State Barge Canal, and perhaps one-tenth on the Missouri and other pseudo-navigable streams and canals.

"Railroads may charge less than costs on all tonnage for a time, but bankruptcy is the inevitable terminus of the road which follows this policy continuously. No such fate awaits the inland water carrier, because the Federal or State Government pays all the costs of building, improving, and maintaining the waterway. The rail shippers must pay all these capital costs, besides the costs of maintaining railway equipment, taxes on property and income, and the costs of moving traffic. The Ohio State Chamber of Commerce calculates that the transportation costs by the Mississippi River, allowing for costs of carrying the capital investment, for maintaining the waterway, and for tax exemption on the improvements, amounts to 10.85 mills per ton-mile, although the average costs were reported to the public at 4.23 mills per ton-mile because that was what water carriers charged the shippers. All the water shipper pays is the cost of maintaining equipment and moving traffic. Jones, the taxpayer, pays two-thirds to nine-tenths of the freight.

"This may be good for the carrier and shipper by water, but it is very bad for the taxpayers and the railroads.

"It is asserted that our Great Inland Empire, and other sections of the country need more transportation lines than they now have. For the past four years, however, both rail and water carriers have complained about the scarcity of freights. If more traffic lines are needed, the sensible thing to do is to build the cheapest and most efficient lines. It is conservative to say that eight railroad tracks, open 12 months in the year, could be laid connecting Duluth, St. Paul, and Chicago with New Orleans for what it has already cost to tinker up the Mississippi River into a partially navigable stream for a part of the year. If the Federal Government must sudsidize the industry of transportation (which is an unsound policy) then the subsidies should be granted to the most efficient type of transportation.

"Subsidized auto-truck and bus lines hurt the railroads even more than subsidized water routes. Railroads carried more than 80 per cent of all traffic; Great Lakes' vessels, nearly 15 per cent; other inland water carriers and motor trucks, less than 2 per cent each. It is absurd folly to give the use of the public highways to motor traffic practically free of charge thus enabling motor trucks to take traffic away from the railroads and to force down all rates on merchandise below remunerative levels. If motor vehicles paid in license fees, tolls and gasoline taxes an amount sufficient to pay for the current capital costs and maintenance of the highways they use and abuse, there would be no problem of motor competition with the railroads. The long haul and transcontinental truck and bus lines would disappear overnight, and the railroads would be left in possession of those fields because they are the better and cheaper carriers over long distances.

"What is needed is the creation of an all-round transportation System for the United States, Canada, Mexico and Central America. Instead of encouraging water and motor carriers by unfair subsidies to cut under railroad rates, we should compel all common carriers to co-operate in furnishing transportation to the public by the best and cheapest means. We are dealing with transportation on the theory that there are five separate and mutually exclusive problems, namely, water, rail, truck, pipe-line, and air transportation. We cannot permanently relieve the railroad crisis until we recognize that the problem of transportation is a single big composite problem and that the different types of public carriers are not inherently hostile competitors, but must be made supplemental parts of a united system."

"CRATES FOR SODA FOUNTAINS" is the title of the latest bulletin (No. 23) issued by the Freight Container Bureau of the American Railway Association, 30 Vesey street, New York City. It is a pamphlet of 12 large pages.

THE QUEENSLAND RAILWAYS (AUSTRALIA) have introduced rail motor cars as a measure of economy, according to Commerce Department reports. The system is now said to possess the largest fleet of these motors in Australia, consisting of 29 motors and 58 trailers, operating on 32 sections of the system, but a satisfactory heavy motor has not yet been found. Most of those now in use are 45 hp., but in November, 1930, two motors of 100 and two of 150 hp. were put into service, with passenger capacities of 108 and 130, respectively.

Motor Transport Hearing at Los Angeles

(Continued from page 370)

of commodity movements and revenues, pointing out heavy and steadily increasing losses in tonnage to motor carriers. Among the commodities mentioned as having been taken from the railways by motor trucks were cotton, sand and gravel, fruit, livestock and gasoline. Motor trucks, Mr. Levy testified, are now operating over lengthy routes, this having been made possible by improved roads and better equipment. Operations are being carried on profitably over routes 300 miles or more in length. The combination of motor trucks and steamship lines is proving an effective railway competitor. At the Los Angeles harbor, 65 per cent of all port tonnage now moves by motor truck, according to a report of the Harbor Board. The unlicensed and unregulated motor truck operator is crippling the entire transportation industry, according to Mr. Levy, who recommended regulation as a means of eliminating unfair practices and unwarranted competition. Mr. Levy also testified that intelligent co-ordination of train and truck service is desirable. Placing railway rates on an any-quantity basis, instead of a car-load basis as at present, would do much to alleviate the situation, he said. According to Mr. Levy, experience with trucks as competitors has led to the conclusion that the question of cost rather than service determines the choice of the average shipper between different means of transportation.

D. A. Munger, traffic manager of the San Joaquin & Eastern, testified that his company is operating motor coaches and trucks to a considerable extent in an effort to retain its passenger and freight traffic, but that the outlook is none too bright.

O. A. Smith, passenger traffic manager of the Pacific Electric, described the motor coach operations of that railway and its affiliated organizations. A total of 414 motor coaches are operated by the Pacific Electric and associated companies, including 141 motor coaches operated by the Pacific Electric Railways, 148 motor coaches by the Los Angeles Motor Coach Company, and 125 motor coaches by the Motor Transit Company, in which the Pacific Electric has a two-thirds interest. The motor coach operations of the Pacific Electric, according to Mr. Smith, include several lines operated as protection against competition, several as feeders in newly developed territory, and other lines operated for the purpose of serving territory not adequately served by other rail or motor coach lines. In a few instances, where railway lines have become worn out, and where traffic is comparatively light, motor coaches have been substituted for trains as a means of reducing operating expenses and avoiding the expense of reconstruction. Mr. Smith said that while the Pacific Electric has been able through the operation of motor coach lines to forestall a material amount of competition, there is still some competition from several independent operators. He estimated, however, that of the total competition afforded by both private automobiles and passenger motor carriers, 85 per cent is from the private automobile and 15 per cent is from the motor coach.

A number of representatives of motor truck lines or motor truck associations took the stand after railway witnesses had completed their testimony. Among them were H. P. Merry, general manager of the Southern California Freight Lines; J. R. Thompson, manager of the Arizona Fast Freight Company; D. G. Shearer, secretary of the California Interurban Motor Transportation Association; and F. H. Asbury, president of the Asbury Truck Company of Los Angeles, and of the Asbury Transportation Company of Portland, Ore., and vice-president of the Motor Transportation Association of California. The truck witnesses stressed the advantages of their service for hauls up to 500 miles, and agreed with the railway witnesses in asking for the regulation of unlicensed motor truck operators.

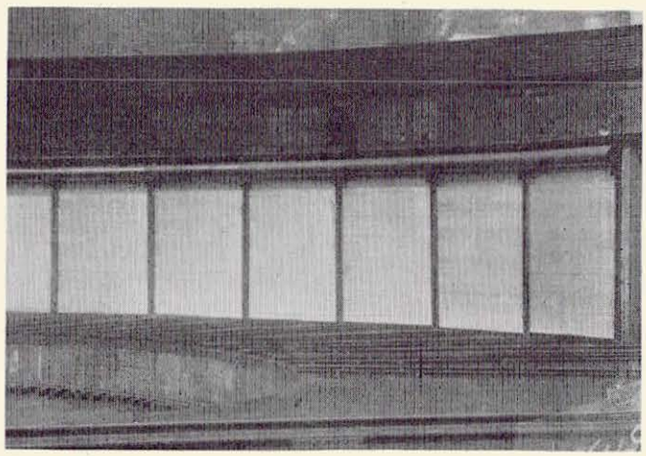
The hearing was continued at Denver, Colo., on February 9.

Aluminum Alloy Used in Enginehouse Doors

WITH the idea of securing greater speed of operation and increased life in enginehouse doors, the Norfolk & Western recently installed 21 vertical rolling, or curtain-type doors, constructed of light, strong aluminum alloy, in the older of its two enginehouses at Williamson, W. Va. These doors, which were furnished by the J. G. Wilson Corporation, Norfolk, Va., are 13 ft. wide by 19 ft. 11 in. high, and weigh 323 lb. each. The slats of the new doors are made from 19-gage aluminum alloy sheet and the bottom bar in each case is an angle section of the same material produced by the extrusion process. Fabrication throughout is with aluminum rivets.

Operation of the doors is by means of chain hoist mechanisms, in each case consisting essentially of a train of spur gears having a ratio of 6.8 to 1. It is said that the new doors weigh less than one-third that of doors of similar type constructed of galvanized steel sheet, and that they can be raised and lowered about three times as fact because of the smaller gear ratio possible in the operating mechanisms.

In addition to the lightness of the new doors and the increased speed with which they can be operated, it is expected that the doors will give unusually long life because of the high resistance of the aluminum alloy of which they are constructed to the corrosive action of sulphur fumes and other gases prevalent about engine houses. In view of this quality of the aluminum alloy used, the doors are not painted, which eliminates one item of usual maintenance work.



Some of the Aluminum Alloy Doors in the Enginehouse at Williamson, W. Va.

Communications and Books . . .

Why Go to Congress Regulate Forwarding Companies?

St. Louis, Mo.

To the Editor:

It is interesting to note that the Interstate Commerce Commission proposes to go to Congress for authority to regulate forwarding companies, and one of the reasons given by the Commission, as quoted in your issue of December 13, 1930, on page 1263, is quite obvious—

"The result is that shippers of less carload freight, more particularly in the larger cities, are today confronted with a situation similar to that which existed in respect to railroad rates prior to the enactment of the Act to Regulate Commerce. That is to say, there is no stability in the rates of the forwarding company, and the shipper has no means of knowing definitely what rates his competitors, or even he, himself, will have to pay these companies from day to day for the carriage of less carload shipments."

Why wait for this slow process of obtaining results by legislation? What occasion would there be for seeking such authority if the railroads were to abolish or amend Rule 10 of the Consolidated Classification, which is the fundamental feature upon which these consolidating companies operate, and, for the general benefit of the shipping public, establish reasonable rates and liberal carload minimums applicable only on specific, clearly defined, single commodities, when loaded by the consignor and unloaded by the consignee?

With that confusing and now much absurd rule thus treated, might not the railroads very consistently establish universal store door and factory pick-up and delivery of less carload shipments, so that the shippers now using Rule 10 in making shipments directly from their factories or individual places of business would thus be given the full benefit of less carload, expedited service through the freight houses, and the carriers enabled to obtain and retain their full revenue on all less carload shipments?

To establish this condition to the satisfaction of the shipping public, would it not be advantageous for the railroads individually to utilize the facilities of the express company and/or to own and operate truck facilities parallel to or in co-ordination with their rail facilities? Haven't we reached the point when, for the benefit of the shippers and the carriers, such action should be taken?

P. W. Coyle.

New Books

Elektrische Vollbahnlokomotiven, by Dr. Ing. H. Gruenholz. 360 pages, 8¼ in. by 11½ in., 477 illustrations, 13 inserts, bound in cloth. Published for the Allgemeine Elektricitäts-Gesellschaft, by Druckerie und Verlagsanstalt Norden, Berlin, Germany.

This work covers in considerable detail the construction and operation of electric main line locomotives. While it is naturally concerned more wth single-phase, alternating current locomotives, which are in general use in Germany, it also gives considerable attention to direct-current locomotives. The illustrations are principally of equipment built by the A. E. G., but these have been supplemented by others to show foreign construction methods. The book is divided into several sections, the first covering the general characteristics of electric locomotives; the second, the mechanical details; and the third and most extensive, the electrical details. This section is divided into two parts, dealing separately with alternating current and direct current motors and accessories for electric locomotives. It is suitable as a text book for those who wish to become familiar with the characteristics and construction of electric locomotives. The expert will also find the book of value for reference purposes, since the information is presented in clear and concise form.

The United Kingdom, An Industrial, Commercial and Financial Handbook, by Hugh Butler, 953 pages, 9 in. by 5½ in. Bound in cloth. Illustrated. Published by the United States Department of Commerce. Price $1.75.

This book is an "effort to survey within the compass of a single volume the highly complex economic structure of one of the leading manufacturing and trading countries of the world." The work is conveniently divided into four parts discussing in turn British industries and commerce, banking and finance, the United Kingdom as a market and Northern Ireland. The latter section comprises such specialized reference to United Kingdom territory in Ireland as could not logically be included in the more general discussions.

In the Department of Commerce classification of its publications this volume is designated as "Trade promotion Series—No. 94." In its preparation Mr. Butler, who is American Trade Commissioner at London, was assisted by officers of the Departments of Commerce and State.

Automatic Train Control; Development and Progress. Bulletin No. 1, published by the Committee on Automatic Train Control, A. R. A. 190 pages, 6 in by 9 in. Paper binding. Address of the Committee, Transportation Building, Washington, D. C. Price $1.50 (Half price to officers and employees of member roads.)

The Automatic Train Control Committee has issued pamphlet descriptions of the continuous inductive train control systems of the Union Switch & Signal Company (Bulletin No. 8) and of two systems of the General Railway Signal Company (Bulletin No. 9); (*a*) the continuous inductive train control and (*b*) the Miller intermittent inductive train control. Bulletin No. 8 fills 218 pages and No. 9 has 74 pages. These descriptive pamphlets include not only full details of the system and apparatus, but complete chapters of descriptive matter relating to each particular installation. The Union System is in use on 17 different roads.

This series of descriptive pamphlets now includes No. 2, G. R. S. intermittent inductive; No. 3, Union intermittent inductive; No. 4, Miller intermittent electrical contact; No. 5, Regan intermittent electrical contact; No. 6, National, intermittent magnetic induction; No. 7, Sprague intermittent magnetic induction, and Nos. 8 and 9 just referred to.

Reviewing the whole subject, the committee now issues Bulletin No. 1, described at the head of this article. The development covered by the narrative begins in 1901 when the Kinsman device was installed on the Boston Elevated, and covers every serious experiment which has been made from that year down to the present time; and by way of good measure there is included a picture of the Vogt type, tried on the Pennsylvania away back in 1880. The work of the Block signal and train control board, and the Bureau of Safety, Interstate Commerce Commission, and of the United States Railroad Administration, receive full attention. The recent reports of the Interstate Commerce Commission, together with tables and other data, are given substantially in full. This 190-page compilation contains many items of information which never until now have been brought together in convenient form.

Thirty pages are taken up with a bibliography, compiled by the Bureau of Railway Economics, Washington. This is arranged chronologically, beginning with 1902, though there is included also a reference to the description of the Kinsman system, published in the *Railroad Gazette* of June 8, 1894. The chronological arrangement of the bibliography will be particularly appreciated by those readers who are well informed on the general subject, and its history; and for those not so well informed there are two alphabetical indexes, one of devices and one of railroad companies. Throughout the 29 pages of data, the paragraphs are numbered (from 1 to 566) and the indexes give reference to these numbers. For example, the first item on the Chicago & Eastern Illinois comes in 1914 and the last one in 1927, but these and the other paragraphs in between are brought together in one line, in the index; numbers 109 and 496. Likewise the Schweyer automatic train stop will be found in items 166 (1918) 330 (1923) and others in between.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Bulletin of the National Research Council, No. 81—Industrial Research Laboratories in the United States.—A catalogue of 1600 laboratories operating in the industrial field including with each listing a brief description of the nature of the work being done. 268 p. Pub. by the National Research Council of the National Academy of Sciences, Washington, D. C. $2.

Douglas Fir Use Book—A compilation of facts, data and tabular matter on the properties of Douglas fir, of value to engineers and architects in designing timber structures. 204 p. Pub. by West Coast Lumbermen's Association, 364 Stuart Bldg. Seattle, Wash. Single copies $1, in lots of 25 or more 85 cents each.

Forty-third Annual Report on the Statistics of Railways in the United States for the Year Ended December 31, 1929, prepared by Bureau of Statistics, Interstate Commerce Commission. Division I contains review of statistical results of steam railways, water carriers, Pullman Co., electric railways, pipe line companies, telegraph and cable companies, telephone companies and express companies. Division II contains summary statements and Division III, abstracts of reports of individual steam railways. 272 p. Pub. by U. S. Govt. Print. Off., Washington, D. C., $1.30.

Steaming Up! The Autobiography of Samuel M. Vauclain. Written in collaboration with Earl Chapin May. The Chairman of the Baldwin Locomotive Works recalls his career. 298 p. Pub. by Brewer & Warren, New York City. $5.

Tests of a Mikado-Type Locomotive Equipped with Nicholson Thermic Syphons, by Edward C. Schmidt, Everett G. Young, and Herman J. Schrader. Report of an investigation by the Enginering Experiment Station, University of Illinois, in co-operation with the Illinois Central and the Locomotive Firebox Company, abstracts of which have appeared in the *Railway Age.* 99 p. Pub. by University of Illinois (Eng. Exp. Sta. Bull. 220), Urbana, Ill. 45 cents.

Periodical Articles

Battlefield of Traffic, by Wilson Wells. "It is a contest in which organized labor and railroad management are ready to unite to stand shoulder to shoulder against the increasing inroads of an unfair and unregulated highway and waterway transportation which is sapping the very lifeblood of the company's business arteries." p. 322. Railroad Man's Magazine, February, 1931, p. 321-327.

The Cost of a Merchant Marine, by George Anderson. "Something being accomplished." Barron's, February 9, 1931, p. 19, 21.

Large-Scale Integration and Its Unique Effect on the Petroleum Industry, by M. David Gould. "Transportation" p. 267 discusses pipe-line versus tank-car transport of petroleum. Annalist, January 30, 1931, p. 267-268.

The Railroads: Their Backs to the Wall, by Winthrop M. Daniels. The present railroad situation with particular reference to consolidation projects. Engineering News-Record, February 5, 1931, p. 223-226.

Taxes, Industry's Increasing Burden, by Julius H. Parmelee. Discusses a serious state of affairs. Scovill Standard, January-February, 1931, p. 7-9.

Weekly Business Index Revised; Cotton Cloth Series Added, Other Changes. "For freight car loadings the new trend line is horizontal in recognition of the well known fact that because of increased competition from other transportation agencies . . . larger freight car capacities, increased operating efficiency and possibly other factors, there has ceased to be any further expansion of a long-time or secular character in the number of cars loaded. The revised adjusted index of freight car loadings represents, therefore, the fluctuations of the seasonally adjusted weekly figures about the average for the period 1925-1930, which is taken as 100." Annalist, February 6, 1931, p. 309-310.

Looking Backward . . .

Fifty Years Ago

Work is now in progress on the extension of the New York, Ontario & Western from Middletown, N. Y., to Cornwall and thence to Haverstraw, and on the tunnel through which the tracks are to reach the Hudson river at Weehawken, N. J. On this extension there are three tunnels, each of which has been driven to provide for double track.—*Railroad Gazette,* February 11, 1881.

The stage coach fare for the gap of 25 miles now remaining between the Atchison, Topeka & Santa Fe and the Southern Pacific at Florida Pass in New Mexico is $11, or about 45 cents per mile. The junction between the two roads is now expected to be made early in March near Deming. The Santa Fe has recently let contracts to extend its line from Fort Thorn, N. M., near Rincon, to El Paso, Tex., about 95 miles, and it is expected that that branch will be in operation before July 1.—*Railway Age,* February 17, 1881.

A contract has been taken by the North River Construction Company, an organization composed chiefly of stockholders of the New York, Ontario & Western, to build the New York, West Shore & Buffalo [now the West Shore, part of the New York Central] from Cornwall, N. Y., along the west shore of the Hudson river to a point near Albany and thence west to Buffalo. From Cornwall to Jersey City, N. J., the trains of the new road are to operate over the tracks of the New York, Ontario & Western, providing a route between New York and Buffalo of about 410 miles.—*Railroad Gazette,* February 11, 1881.

Twenty-Five Years Ago

The Hepburn rate bill, passed by the House of Representatives last week by a vote of 346 to 7, came over this week to the Senate, and was at once referred to the Senate committee on interstate and foreign commerce. The Senate committee proceeded at once to consideration of the House bill, and it was taken up and discussed section by section. The daily hearings have been well attended and have at times been marked by spirited debate.—*Railway Age,* February 16, 1906.

Frank Ringer, heretofore resident engineer of the Missouri, Kansas & Texas, has been appointed principal assistant engineer, with office at Parsons, Kan. H. C. Nutt has resigned as general superintendent of the Missouri district of the Chicago, Burlington & Quincy to accept the position of general superintendent of the Michigan Central at Detroit, Mich. H. W. Stanley, heretofore trainmaster of the Atlanta & Birmingham Air Line [now part of the Seaboard Air Line] at Birmingham, Ala., has been transferred to Atlanta, Ga., as trainmaster of the Third division of the Seaboard Air Line.—*Railway Age,* February 16, 1906.

Ten Years Ago

The decline in the freight traffic of the railways has continued until the volume of business being handled has almost set a new low record for recent years. The total number of cars of freight loaded in the four weeks ending January 29 was 2,819,352. This was 14 per cent less cars than were loaded in the same weeks of 1920, and 4 per cent less cars than in those weeks of 1919, although at the latter time traffic was undergoing the heavy slump which followed the signing of the Armistice.—*Railway Age,* February 11, 1921.

President Wilson on February 6 replied to the telegrams addressed to him by the railroad labor leaders and the railroad executives at Chicago last week, declining to interfere in any way, during the last month of his administration, in the controversy between the railroad executives and the labor leaders regarding the abrogation of the national agreements. The labor leaders had asked for a Congressional investigation of the railroad situation, but the President in his reply indicated confidence that the case is now in the hands of the proper tribunal, following his action in turning copies of the telegrams over to the Railroad Labor Board and the Interstate Commerce Commission.—*Railway Age,* February 11, 1921.

Odds and Ends . . .

"The Specialist" a Former Brakeman

"Chic" Sale, the famous humorist and writer, thought up many of his present acts while serving as a brakeman, riding to and fro on the Big Four, out of Springfield, Ohio.

Long Term Mayor

H. W. Carey, agent for the Baltimore & Ohio at Trenton, Ohio, claims the longest service record of any of the various railway mayors reported in this department. Agent Carey was elected mayor of Trenton in 1914, and has served continuously ever since in his dual capacity.

Cowboy Fireman

F. E. Jones, picturesque early day cowboy, who at the age of 14 drove to Montana the first herd of cattle ever driven from Texas to Miles City, died at Helena recently. Jones was a cowboy until 1887, when he became a fireman on the Northern Pacific.

More A. C. L. Mayors

Robert Scott, editor of the Atlantic Coast Line News, informs us that two additional mayors have been added to his list. They are T. L. Dumas, superintendent and mayor at Sanford, Fla., and A. B. Corey, superintendent elevator machinery, who was recently elected president of the city council of Port Tampa, Fla.

Spanish Railway Law

Railway regulation seems to vary only in minor particulars around the world. In an able treatise, Miguel Martin-Montalvo, secretary of the railway tribunal of Spain, has given a comprehensive resume of Spanish railway law. The book contains 462 closely written pages, and it is amazing how closely the ideas of the railway regulators in Spain follow those in this country.

Railroaders Are Descendants of Indian Queen

G. P. Fletcher, machinist, R. S. Fletcher, retired conductor, and W. I. Fletcher, retired watchman, all of the Elmira division of the Pennsylvania, claim to be the only railroaders in the country who are direct descendants of an Indian queen. One of their ancestors was the famous Frances Slocum, the white child who was captured by the Indians, lived with them, and later became their queen.

A Statistical Messenger

Fred A. Dullahan, messenger for the Central Vermont at St. Albans, Vt., for the past 35 years, has kept a complete statistical record of his occupation. He has averaged 10 miles a day, 300 days a year, for 35 years, giving him a total mileage of 105,000, or 5,000 miles more than four times around the world. The total amount of cash and checks that he has carried to banks totals $3,192,080.40.

Minister Former Shopman

His former associates in the Illinois Central Walker Avenue shops at Memphis, Tenn., have been getting a great deal of "I-told-you-so" satisfaction out of the career of the Rev. Willis T. Wrenn, who was ordained a Methodist minister in November and is now occupying the pulpit of the Chelsea Avenue Methodist Church, Memphis. Mr. Wrenn did not wear the title "reverend" when he applied to W. F. Lauer, then general foreman, for a job in 1922. He was a young man on the threshold of life, ready to turn his hand to any honest means of making a living for himself and to help his parents. Mr. Lauer was favorably impressed with the youth and put him to work as a helper apprentice. Three years he worked to learn his trade and then he was promoted to machinist. He stayed four years with the company, saving enough money to buy a small farm near Charleston, Miss., which he deeded to his father. Then he became a student in Millsaps College at Jackson, Miss. In January, 1930, he returned to the Illinois Central shops and worked at his trade until November when the Southern Methodist Conference admitted him to the ministry.

A Phantom Railway

A cement plant at Dallas, Texas, has a railway on which cars transfer cement rock from the excavating pit to the crusher, apparently without the direction of human beings. Nobody rides on the cars, which move from place to place, starting and stopping here and there as though possessed of an intelligence of their own. The railway is operated by two dispatchers, who direct the movements of what are called "riderless larry cars" by remote control. Each car is equipped with 50 hp., squirrel-cage motors, and has electric solenoid brakes. The power is collected from the track system.

Open-Air Observation Cars

In connection with the item in the January 17 issue of the *Railway Age* regarding the open top observation cars used on the Saratoga & Encampment Ry., in 1907, Percy H. Lash, valuation auditor, Chesapeake & Ohio, calls attention to the fact that such a car was operated over the Delaware & Hudson in 1875. In this case, however, it was for the benefit of the officers of the line and no other passengers were handled. P. C. Withrow, mechanical engineer of the Denver & Rio Grande Western, also calls our attention to the fact that the Denver & Rio Grande Western operated cars of this type in regular passenger service as early as 1882. He states that these cars were constructed the same as the regular coach, with the exception that they extended only as high as the window sills.

An Application for Employment

The following 73-year old classic was called to our attention by George A. Richardson of the Bethlehem Steel Company:

Feb. 22—1858.

Mr. Saires Proprietor of the Lehigh Valley R. R. Sir as I am about to right thoes fiew lines too you to fint out wether their would bea a chaines for an Enghineer on that roat this Spring when work starts Brisker I have bin Aruning agood part of my time on railroades and I have bin now for better than three years Runing Sloap Enghines at Feins ville and I have bin runing for Cool & Camell Lockert All the wile that they hat the works at Beaver Meadows as this Sloap Enghine runing is Every other weak night work and Sundays I have Mait up my mint too quit it ant go on too some Roat the last I have run on the roat I run on the Reading roat ant I took the Smallpox and started mast too soon ant hat too bea out the moast part of my time By night ant the nights Being veary foggy I hat poor helth so I left it but I shall chains it again I have a sun 17 years of age I shoult half too hav some embloyment for him if their was aney vacant ½; aise too fire till their was a chains to run I shouly come I rought too Fretrick rustay some time ago ant nver received no answer wether he received it or not I dont know

You will fint me too Brave Steaty Faithful and sober I never in my life lost A days work yet unless with sickness when I hat work as I have a large family I should half to fint out wheir suitablest blaise should bea for too move too that I might look out About a house you will Pleasmant right me an Return answer immetiately ant then I will Coame down and sea you I shoulta come down too sea you but as times is so hart at preasant I thought I woultent loose more time then I coult help Please ant wright immetiately for I want too Leave this plais as soon as i can

Luzern County Feinsville
Jonas Beltz

NEWS

Pipe Line Company Files Tariff of Rates on Gasoline

The Great Lakes Pipe Lines Company has recently filed with the Interstate Commerce Commission a tariff publishing interstate rates on gasoline from Ponca City and Barnsdall, Okla., to points in Kansas, Nebraska and Missouri, which has attracted some attention because the most important rates in it seem to be based exactly on the all-rail rates, so that any economies resulting from the use of the pipes instead of rail accrue to the six mid-continent refining companies that are understood to own the stock of the pipe line company while other shippers of gasoline through it would pay just as much as if they had shipped by railroad. The important rate in the tariff is 70.5 cents per barrel of 42 gallons from Oklahoma to Kansas City, which is equivalent to the rail rate of 25.5 cents per 100 pounds, while proportional rates are named to other points with a provision for a refund of switching charges from the pipe line to the outbound carrier so that the through charges from point of origin to destination will also be the same as the all-rail rates.

The railroads have proposed as a part of their "equalization" program that pipe line common carriers be subjected to the same restrictions as to the transportation of commodities in which they are interested, directly or indirectly, as the railroads now are. The railroads are subject to the "commodities" clause of the interstate commerce act which prohibits them from transporting products in which they are interested and Representative Hoch has introduced in Congress a bill to apply this principle to pipe lines by amending the clause to apply to "common carriers" subject to the act, but the question would still remain as to whether the pipe line is "interested" in the product of a company owning its stock. The Department of Justice has attempted to apply that principle in a suit against the Elgin, Joliet & Eastern Railway, which transports the products of the United States Steel Corporation, which controls the railroad, but the case is still in the courts. The Hoch bill is understood to have been inspired by the independent oil interests. The House committee on interstate and foreign commerce has announced a hearing on the bill for February 17.

Club Meeting

The Traffic Club of Chicago will hold its annual banquet on March 19, with Silas H. Strawn as the principal speaker.

Advertising

Advertising is a stimulant to trade. It is one of the important component parts of our entire present day economic and social system. It conveys to readers and listeners information about articles of commerce and creates in the minds of such possible purchasers a desire to have and use the thing that is being advertised. This desire working upon the mind of the reader and listener, in many cases, results in purchases, and the accumulated demand thereby created brings about increased production and distribution.

Stagnant trade in times of depression may be transformed through the help of advertising into industrial activity. The atmosphere of discouragement may be cleared of its haze and business can then take on a normal hue. This has been demonstrated through new articles being placed upon the market and given wide distribution through the medium of advertising.

(The foregoing is taken from an address made by J. L. Haugh, vice-president of the Union Pacific, before a meeting of the Advertising Club of Los Angeles on January 20).

Thorough Investigation of Competitive Situation Proposed

A joint resolution to direct the Interstate Commerce Commission to make an investigation of transportation by motor vehicles, waterways, pipe lines and airplanes, similar to that which it is now making as to motor vehicles, with a view to whether they should be regulated or further regulated by the government, was introduced in the House on February 11 by Chairman Parker of the House committee on interstate and foreign commerce, and also in the Senate by Senator Fess at the request of representatives of the railroads. The resolution would direct the commission to report to Congress in December with recommendations and drafts of appropriate bills to carry them into effect. The investigation is also to include the effects of competition of other forms of transportation on railroad revenues and the question whether existing government regulation of interstate commerce should be modified or amended.

Urges Relief from Taxation and Uneconomic Competition

Emphasizing the interdependence of all groups of our economic system with railroad service, S. P. Bush, of Columbus, Ohio, chairman of the Transportation Committee of the National Association of Manufacturers, following a meeting of the committee, today issued a statement calling attention to current railroad problems and urging that relief at this time lies in the direction of consolidations, reducing excessive taxation and minimizing destructive and unfair competition.

"The unprecedented material progress of the United States during the last century, particularly the last fifty years, is due primarily to the substitution of fuel, with its power and transportation aspects, for most of the formerly used muscular effort," the statement says in part. "This has changed us from a nation of individuals to a nation of highly interdependent economic groups and relationships with clearly defined duties to each other.

"These groups may be classified as agriculture, transportation and other public utilities, labor, industry and finance, and because of this interdependence, if one of these groups fails to thrive or to function normally, the others are adversely affected; therefore, the welfare of the one must become the concern of all, and co-operation between these groups must be effected if the general welfare of the country is to be served.

"Today we find two of these basic groups in a very unfavorable position. Agriculture, the most basic of all, is in a position where its purchasing power and credit are at a very low ebb.

"But add to this the present condition of rail transportation. * * * The railroads have gone as far as they can in helping themselves by reducing the cost of operation, but practically all of the reduction in cost of operation has been absorbed in reduction of freight rates. Reduction of freight rates has been further accelerated and augmented by competitive conditions and by governmental regulation. To increase freight rates or to reduce wages at this time would add to the economic disturbance; and immediate reduction of operating expenses other than by reducing wages, seems impossible at the present time.

"The only opportunity for relief at this time lies in the direction of consolidations, relief from excessive taxes, and relief from destructive and uneconomic competition. The consolidations

recently proposed by the four eastern trunk lines are soundly economic, in the public interest, and should be permitted to become effectuated. Taxes should be materially reduced and competition be made fair. The public is justly entitled to the best and cheapest form of transportation, but it is highly destructive and not in the interest of the public that any one form of transportation, such as the railroads, should be compelled to include in its costs every item which should properly go into cost, such as full maintenance taxes, interest, etc., and be required to compete with other transportation agencies which are not required to base their rates on costs similarly computed; or in other words, to compete with other subsidized agencies as at present. A continuance of this economic and political philosophy must necessarily make our present situation worse."

Favor Equalization of Transport Competitors

Legislation to place all common carriers on the same plane of taxation is called for in a resolution adopted on January 28 by the Association of Shop Employees of the Nashville, Chattanooga & St. Louis. Endorsement of the movement was asked of all business and professional men in Nashville.

Second Frisco Oil Well

A second oil well has been brought in on property of the St. Louis-San Francisco near its roundhouse at Oklahoma City, Okla. The well, which has been capped, has an estimated flow of 37,800 bbl. of oil and 26,000,000 cu. ft. of gas daily. The first well, brought in on December 3, has a daily capacity of 40,000 bbl. of oil and 43,000,000 cu. ft. of gas.

Two Cents a Mile

The Chicago, St. Paul, Minneapolis & Omaha has established a two-cent passenger rate on several of its lines for the period from February 9 to April 30. The rates are in effect from Pipestone, Minn., to Heron Lake; from Spooner, Wis., to Ashland, including the Bayfield branch; and from Emerson, Neb., to Norfolk, including the Bloomfield and Crofton branches.

I. C. C. Denies Further Postponement of Car-Hire Settlement Order

The Interstate Commerce Commission has denied the petition of the American Railway Association for a further postponement of the effective date of its order in the rules for car-hire settlement case pending an appeal to the Supreme Court. The postponement was opposed by the American Short Line Railroad Association.

Nevada Train-Limit Bill

The Nevada house of representatives on February 7 passed a bill forbidding the operation of railroad trains in that state longer than 70 freight cars or 14 passenger cars. The measure served Gov. F. B. Balzar as an issue in his campaign for the governorship last year and was recommended in his message to the legislature. The bill is expected to meet strong opposition in the Senate.

Competitive Two-Cent Fare Disallowed

The Interstate Commerce Commission has denied an application filed by the Louisville & Nashville for authority to establish reduced coach fares between St. Louis, Mo., and Birmingham, Ala., and Pensacola, Fla., to meet the competition of the two-cent fares made effective on February 1 by the St. Louis-San Francisco, without making similar reduction at intermediate points.

New Officers of Ft. Worth Traffic Club

At the annual meeting of the Traffic Club of Ft. Worth on January 15, the following officers were elected: President, R. L. Carnrike, commercial agent of the Clyde Mallory Lines; first vice-president, B. D. Locke, traffic manager of the Monig Dry Goods Company; second vice-president, T. K. Hale, traffic manager of the Texas Electric Service Company; and secretary-treasurer, D. H. B. Todd of the Ft. Worth & Denver City.

New Industries in the South

The Central of Georgia during 1930 had 128 new industries located on its lines and 65 other industries made additions to their plants. These enterprises altogether led to the employment of 4,153 persons. The Industrial Development Department of the Central of Georgia gives aid, without charge, in the securing of locations for new enterprises; and the department has a consulting textile engineer, a chemical engineer, a geologist and a ceramic engineer.

C.G.W. Life Insurance

The Chicago Great Western has entered into a group life insurance program, underwritten by the Equitable Life Assurance Society of the United States, which provides death and disability benefits for all employees. Under the plan, an employee whose salary is $200 or less per month may subscribe to $1,000 of insurance, for which he pays 60 cents a month. Employees whose salaries are between $201 and $300 may subscribe to $2,000 of insurance; between $301 and $400 to $3,000, and over $401 to $5,000.

Cloverport Protests Loss of Shops

The Louisville, Henderson & St. Louis and the Louisville & Nashville, which acquired the former in 1930, have filed a suit in the federal district court at Louisville, Ky., to restrain the City of Cloverport (Ky.) from forcing the railroad to maintain shops in that city. The city alleges that in April, 1894, it paid the Louisville, Henderson & St. Louis $20,000, in return for which the railroad agreed to maintain shops there permanently. The city not only asks for the return of the $20,000, but seeks $30,000 in interest. Plans for the consolidation of the facilities of the two roads contemplate the abandonment of mechanical facilities at Cloverport and the railroad holds that their retention would be a hindrance to interstate commerce.

Bus Fares Reduced

Representatives of 12 southwestern motor coach lines, at a meeting in Kansas City, Mo., decided to establish their fares on a basis of two cents a mile, effective February 5, to meet the two-cent rate established by the St. Louis-San Francisco and other railways. Among the motor coach companies represented at the meeting were the Missouri Pacific Transportation Company, and the Southwestern Transportation Company, subsidiaries respectively of the Missouri Pacific and the St. Louis Southwestern.

Automobiles as Baggage on Missouri Pacific

The Missouri Pacific has made arrangements whereby passengers over its lines may ship their automobiles as baggage from St. Louis and Kansas City to points in Colorado, Texas, and Louisiana. Persons taking advantage of the arrangement are required to purchase a minimum of five summer tourist fares for the transportation of one automobile and not exceeding two adult passengers. For example, for a payment of $189, two passengers may travel, with an automobile shipped as baggage, between St. Louis and Denver, Colorado Springs, or Pueblo.

Transportation Club of St. Paul Elects Officers

At a meeting of the Transportation Club of St. Paul on January 20, the following officers were elected: President, Max Goodsill, general passenger agent of the Northern Pacific; vice-president, Wayne E. Butterbaugh, professor of transportation of the University of Minnesota; second vice-president, W. L. Mansfield, general passenger agent of the Chicago & North Western; treasurer, Guy E. Dailey, assistant vice-president of the American National Bank; and secretary, Charles E. Liggett, service agent of the St. Paul Association of Commerce.

D. & R. G. W. Subsidiary Plans Store-Door Service

The Rio Grande Transportation Company, motor vehicle operating subsidiary of the Denver & Rio Grande Western, has been granted authority by the Colorado Public Utilities Commission to provide store-door collection and delivery service for l.c.l. freight moving over the Denver & Rio Grande Western to and from Denver, Colo., Colorado Springs, Pueblo, Salida, Walsenburg, Alamosa, and Trinidad. There will be no additional charge to cover pick-up and delivery, above the regular freight rates for station-to-station service.

Thirteen Million Man Hours

Four shops of the Southern have been run for 4,681 shop days without a reportable casualty; which, says Lew R. Palmer, who reports the figures for the National Safety Council, is an all-American railroad shop record. The shops are those at

Birmingham, Ala., (Finley shop), Selma, Ala., Hayne, S. C., and Lawrenceville, Va. The last casualty recorded at Lawrenceville was on August 21, 1926; at Hayne, June 25, 1927; at Selma, February 4, 1928, and at Finley shop December 19, 1928. The total number of man-hours worked in the respective shops since those dates, up to January 1, 1931, has been 13,110,578. The Lawrenceville shop in this time has been in operation 1,593 shop days.

The record of Finley shop, in which the man-hours have totaled 6,413,138 in the two years and 12 days covered, makes, says Mr. Palmer, the banner record for shop safety among Class I railroads.

Rock Island Subsidiary Denied Iowa Highway Certificate

The application of the Rock Island Motor Transit Company, subsidiary of the Chicago, Rock Island & Pacific, for authority to operate motor coaches between Des Moines, Iowa, and Davenport, has been denied by the Iowa Board of Railroad Commissioners. The commission held that there is already adequate service over this route. The commission also mentioned in its denial of this application the fact that the Rock Island Motor Transit Company has as yet failed to operate motor coaches between Des Moines and Council Bluffs, under authority granted by the commission in March, 1930.

Plan Proposed for Development of Newark Bay District

A 50-year program of city and harbor development and land reclamation, estimated to cost a total of about $500,000,000, has been laid before the New Jersey legislature, with the idea of developing Newark Bay as a port with facilities equal to those of New York harbor. The project would include the reclamation of 22,000 acres of waste marsh lands between Hackensack and Elizabethport, N. J., while the entire area included by the program is estimated as sufficient to support a population of 5,000,000. Additional features of the plan include the construction of a terminal for passenger steamers; the construction of a 30-mile belt railroad connecting the eight trunk lines now crossing the region involved, and the development of highways, parks and industrial and residential sites.

New Railroad Commissioners in Ohio and Wisconsin

Gov. Philip F. La Follette has reorganized the Railroad Commission of Wisconsin by appointing Theodore Kronshage and David Lilienthal as commissioners succeeding Adolph Kanneberg and Philip H. Porter, respectively. Mr. Kronshage has been appointed for a term of six years, while Mr. Lilienthal fills the unexpired term of Mr. Porter who resigned on January 1 to become counsel for the commission, a position he occupied before his appointment as a member in 1930.

Edward J. Hopple of Cleveland, Ohio, has been appointed a member of the Public Utilities Commission of Ohio for a period of six years, succeeding William Klinger. C. V. Terrell, the senior member of the Railroad Commission of Texas, has been elected chairman of the commission for 1931 and 1932. Milo R. Maltbie, chairman of the New York Public Service Commission has been reappointed as a member of that body for a term of 10 years.

"Pullman Facts"

The Pullman Company has prepared and is now distributing a series of 12 booklets illustrated with original drawings and bearing the general title of "Pullman Facts." Twelve million copies in all will be printed for general distribution on trains and in ticket offices; to schools and libraries and in other places throughout the world.

The booklets deal with such subjects as "Service You Get with Your Pullman Ticket," "Evolution of the Pullman Car," "The World's Greatest Housekeeper," "Building a Pullman Car," "Safety," "Scientific Ventilation in Pullmans," "How Pullman Cars Are Lighted," etc.

The laundry bill of the company for a single year amounts to $3,073,359; a stock of 10,000,000 pieces of linen is kept on hand continually, the annual "wash" of the company amounts to 33,434,268 separate pieces and the number of employees engaged in cleaning Pullman cars is 4,991.

Equipment Installed

New freight cars installed in service by the railroads in 1930 totaled 76,909, according to reports compiled by the Car Service Division of the American Railway Association. This was a reduction of 7,985 cars under the number placed in service in 1929 but an increase of 18,514 cars above 1928 and 1,523 cars above 1927. Box cars totaled 40,042; coal cars 27,911; refrigerator cars, 3,974; flat cars, 3,668; stock cars, 913; and miscellaneous cars, 401. The railroads in 1930 also installed 782 new locomotives, compared with 762 in 1929; 1,390 in 1928, and 1,955 in 1927.

New freight cars on order on January 1, 1931, totaled 9,821, of which box cars totaled 4,357; coal cars, 3,278; refrigerator cars, 1,543; stock cars, 500, and flat cars, 143. On January 1, 1930, the railroads had 34,581 new freight cars on order, and on January 1, 1929, there were 13,036 on order. New locomotives on order January 1, 1931, totaled 120 compared with 431 on January 1, 1930, and 147 on January 1, 1929.

Baldwin Site Suggested for Baltimore & Ohio Philadelphia Station

Samuel M. Vauclain, chairman of the board of directors of the Baldwin Locomotive Works, in a letter to Mayor Mackey of Philadelphia, Pa., has recently outlined a plan for the construction by the Baltimore & Ohio of a new passenger station on property owned by the Baldwin Locomotive Works on North Broad street, Philadelphia. Mr. Vauclain's suggestion involves a change in plans previously considered by the Baltimore & Ohio for the construction of a union station at 24th and Chestnut streets, so that the road may take advantage of the more central location afforded by the removal of the Baldwin plant to Eddystone, Pa., some years ago. The new Central station would be used by the Baltimore & Ohio, the Reading, the Lehigh Valley and the Erie, while part of the present Reading terminal at Twelfth and Market streets would be converted into an electrified suburban station and the Baltimore & Ohio site at Twenty-fourth and Chestnut streets would be used as an additional Baltimore & Ohio passenger station.

Gest Street Freight Terminal Opened

The Southern has opened for business its extensive new freight terminal at Gest street, Cincinnati, Ohio. The icing station at this new yard is served by two tracks, each holding 22 cars, and connected with it is a yard with space for 223 cars awaiting diversion. The team track for perishable freight holds 33 cars.

Pennsylvania Safety Record

General W. W. Atterbury, president of the Pennsylvania, awarding 20 trophies to divisions and departments for improvement in safety among employees in the year 1930, announces that the number of casualties to employees on duty during the year averaged 6.2 per million man hours worked, or about 40 per cent better than in 1929, when the rate per million man hours was 10.2. The Central Region stood highest among regions, and the Western Pennsylvania General Division, the highest among general divisions.

For the comparison of superintendents' divisions, the divisions were divided into three groups, large, medium and smaller. Among the larger divisions, the Pittsburgh division stood first, in the middle sized group the Atlantic division, and in the third group the Grand Rapids division.

Various trophies were awarded also to different departments: The maintenance of way, the maintenance of equipment, the station service and the train and engine service.

Milwaukee Reroutes Columbian

On the Chicago, Milwaukee, St. Paul & Pacific beginning February 22, the Columbian, Chicago to Seattle, which now runs via the Twin Cities, will be run by way of Manilla, Iowa, Sioux City, Yankton, S. D., and Mitchell to Aberdeen, where connection is made with the main line to the Pacific Coast. The train will leave Chicago at 9:30 a. m. instead of 11:30 a. m. and will arrive in Seattle at 8 a. m. the third morning as at present. By the rerouting several cities in Illinois, Iowa and South Dakota, are placed on the main line to the northwest.

Eastbound the train will leave Seattle at 10:15 a. m. instead of 9:45 a. m. and will arrive at Chicago at 7:39 a. m. the third morning instead of 7 a. m.

On the same day the running time of two trains between the Twin Cities and

Continued on Next Left Hand Page

SUPPORT
Modern Road Engines
WITH MODERN SWITCHERS

AT THE final inspection of a 5,000-ton train hooked to a Super-Power Locomotive, a defective car was discovered.

■ An antiquated road engine used as a switcher took three cuts before the "bad order" car was removed. Meanwhile, the train had frozen up and over an hour had been lost.

■ Modern road engines, together with all the improvements that speed up operation, are made ineffective unless supported by modern switch engines.

■ On one road, modern switch engines have cut switching costs over 40%.

■ Another road using modern switchers is saving enough from reduced yard costs to pay for the engines in five years.

■ An extensive replacement program is your best means for bringing down terminal costs and at the same time increasing the car handling capacity of your yards.

LIMA LOCOMOTIVE WORKS
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Chicago will be shortened. The schedule of the Fast Mail will be cut from 12¼ hr. to 11 hr., and that of the Pioneer Limited from 12½ hr. to 11 hr. The Fast Mail will leave Minneapolis at 8 p. m. instead of 6:45 p. m. and will arrive in Chicago at 7 a. m. as at present. The Pioneer Limited will depart at 9:30 p. m. instead of 8 p. m. and will arrive in Chicago at 8:30 a. m. as at present.

At the same time, the westbound schedule of the Day Express will be changed so that the train will leave Chicago at 10:30 a. m. instead of 8:30 a. m. and will arrive in Minneapolis at 9:45 p. m. instead of 7:55 p. m.

Appeal to Canadian Supreme Court on Grain Rates

Grain and flour rates in Western Canada are the subject of an appeal upon which argument opened last week at Ottawa in the Supreme Court of Canada. The Goverment of the Province of Alberta appeals from an order of the Board of Railway Commissioners which refused an application by the province seeking reduction in present Canadian National rates from points in Alberta to Fort William, Westport, Armstrong and Vancouver.

In August, 1927, the Board ordered the Canadian Pacific must equalize branch line rates with its main line rates, mile for mile, to either Pacific Coast or Great Lake terminals. The province contends that, once the Board decided to equalize rates, these rates become statutory for all railways and should therefore become applicable to the Canadian National. In its presentation of facts, the province stated that present Canadian National rates are one or two cents higher per 100 pounds than Canadian Pacific branch line rates from certain specified non-competitive points. The Canadian Pacific has joined with the Canadian National in arguing against the appeal.

Barge Lines Enter Loud Complaint

On the ground that, "without peremptory action by the Interstate Commerce Commission," barge-line service on the Mississippi and Ohio rivers "faces complete disaster," the Mississippi Valley Barge Line, the Federal Barge Lines and the American Barge Line have filed an application with the commission asking it to remove the circuity limitations and restrictions which it imposed in its order of December 16 wherein it required the establishment of joint rates and through routes via rail and barge lines. These restrictions, the application says, "must have the effect of completely stifling barge line operations"; and it is asserted that they operate particularly as a handicap to the recently-established Mississippi Valley Barge Line because the Federal Barge Lines had previously built up a considerable system of joint rates. According to the application the commission in its order refused to prescribe through rates when the shortest all-rail distance via the ports of interchange is more than 120 per cent of the shortest all-rail distance between origin and destination—or where the sum of the shortest all-rail distance to and from the ports of interchange is greater than one-half of the shortest all-rail distance between origin and destination. The commission is asked to set up a new standard of reasonableness to control or limit its power to require rates and routes under the Denison act and that such new standard be the existence of all-rail routes and rates via one or more of the ports of interchange encountered in the rail-barge-rail transport, subject to certain provisos. "On the surface," the application says, "it would seem that barge-rail service should go forward in vigorous strides," but, as a matter of fact, it asserts, action by the commission along the lines suggested is necessary to preserve such service.

New York State Peach Rates

Reductions in freight rates on fresh peaches, in carloads, from points of origin in the state of New York to destinations in official territory, are recommended in a proposed report by Examiner H. W. Archer, of the Interstate Commerce Commission, on a complaint filed with the commission by the State of New York, Department of Agriculture and Markets, the New York State Farm Bureau Federation, the New York State Horticultural Society, and the New York State Cold Storage Association. Whereas the present rates are on a second-class basis the examiner recommends that the rates be declared unreasonable for the future to the extent that they exceed 60 per cent of the first-class rates prescribed in the Eastern Class Rate Investigation; but that pending the publication of class rates in conformity to the findings in that case it should enter an order requiring the maintenance of third-class rates. The complainants had asked for rates based on 50 per cent of the present first-class rates. To illustrate, the examiner says that for the average distance of 390 miles from Lyndonville, N. Y., to 44 representative destinations, the basis of 60 per cent of first class would result in a rate of 59 cents as compared with the present average rate to the same destinations of 73.4 cents.

Correction

In the article entitled "Containers Used in Co-ordinated Freight Service," on page 249 of the *Railway Age* of January 24, it was stated that the Motor Terminals Company, Cincinnati, Ohio, "was the leading factor in the organization of Cargo Transport, Inc." This is incorrect. The company instrumental in organizing Cargo Transport, Inc., was the Motor Terminals Company of New York, an engineering and financing organization. The Cincinnati Motor Terminals Company was financed and equipped by the Motor Terminals Company of New York, but it has no connection, financially or otherwise, with Cargo Transport, Inc., except that both companies are licensed to use the equipment resources of the Motor Terminals Company of New York. The Cincinnati Motor Terminals Company is strictly a local operating organization, handling interchange between local freight stations of the railroads in the Cincinnati terminal. Although the Motor Terminals Company of New York was instrumental in the organization of Cargo Transport, Inc., and negotiated the lease of cranes and demountable truck bodies to Cargo Transport, Inc., it has no financial connection with it.

It was also not made clear that Cargo Transport pays to the Cincinnati & Lake Erie a minimum tariff of 30 cents per car mile, whether the car carries one or two containers and whether the containers are empty or loaded. This is based on a minimum tariff of 15 cents per container mile and contemplates a container load of 15,000 lb. For each 500-lb. increase in load up to 20,000 lbs., the rate is advanced one-quarter cent. The charge on containers loaded to the 20,000 lb. capacity is 17½ cents per container mile, or 35 cents per car mile.

Regional Plan Outlines Development of Jamaica Bay Section

One feature of a new and comprehensive plan for the early development of the Jamaica Bay section of Long Island, recently made public by the Regional Plan of New York and Its Environs, is an endorsement, as in harmony with the general plan, of the proposed construction by New York City of a railway connection between the Long Island Railroad and Jamaica Bay. As already planned, this connection would be operated by the Long Island and would comprise both a line to the south side of the entrance to Mill Basin, and, on the east side, to Paerdegat Basin. A committee report recommending this construction and the dredging of Paerdegat Basin has been approved by the Committee of the Whole of the New York City Board of Estimate, and final action by the Board awaits a report from the new Department of City Planning, which held a public hearing on the matter on January 26.

The general principles suggested by the Regional Plan for the development of Jamaica Bay are the same as those recently set forth in the proposal for the development of the Hackensack Meadows in Northern New Jersey, in that both sections are said to be best suited for development as self-contained industrial and residential units. The Regional Plan's view is that the Jamaica Bay of the future should not be envisioned predominantly as a world port, a great industrial center, a residential or recreational area, but rather as a combination of such uses, a more or less self-contained community where advantage has been taken of opportunities for diversification of land uses.

The Fastest Trains

An article in the Technology Review (Massachusetts Institute of Technology, Cambridge, Mass.) for February lists 48 of the most notable fast passenger trains now in operation on American railroads, on 30 different routes. For each train, the table gives the length of its schedule in hours, the miles traversed and the average speed.

The salient feature of the article is a comparison of the best speeds in the

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LIMITED CUT-OFF SWITCHERS SAVE 25% IN FUEL . . .

New Kentucky and Indiana Terminal Locomotives are also Improving Operation by 27%

CONCERNING the new Limited Cut-Off Switchers recently placed in service, Mr. W. S. Campbell, Manager and Chief Engineer of the Kentucky and Indiana Terminal, reports:

■ "Regarding the consumption of fuel, we are showing a saving of about 25 per cent. In other words, the new engines (with larger cylinders, practically twice as heavy and double tractive effort) are consuming very little more coal than the light engines being retired."

■ In the past, standardization and low initial cost have been major considerations in switch engine purchases, rather than maximum efficiency.

■ But now progressive roads are specifying, in new switchers, the elements that have made modern road engines so efficient.

■ Among these is the Limited Cut-Off. With the Limited Cut-Off, switch engines use up to 30% less fuel; 38% less water; have a greater radius of operation; and by reason of the more uniform torque are less likely to slip, resulting in lower maintenance. The lower steam consumption makes possible the use of a smaller grate, thereby lessening standby losses and again saving fuel. They are snappier and do the job quicker.

FRANKLIN RAILWAY SUPPLY COMPANY, Inc.

NEW YORK CHICAGO ST. LOUIS SAN FRANCISCO MONTREAL

years 1910, 1920 and 1930, the table showing each train in each of the three years. A summation of the hours and mileages of the fastest trains shows that the combined average speed of 40.9 miles an hour in 1930 is 6.3 miles faster than in 1910 but 6.9 miles faster than in 1920; in other words, the average speed was not so high in 1920 as it was in 1910. In the average of 34.6 miles an hour for 1910, there is included the Twentieth Century Limited of the New York Central and the Pennsylvania Special of the Pennsylvania, between New York and Chicago, which in that year made the journey each in 18 hours; whereas in 1920 and since then these schedules have been 20 hours.

Similar comparisons of the decades are shown for the different runs in groups as follows:

Group	No. of runs	1930	1920	1910
200—475 miles ...	10	47.2	40.5	42.3
475—1,000	9	41.8	35.5	36.5
1,000—1,200	5	45.2	39.8	43.6
Over 2,000	6	37.8	30.5	29.9

Some of the runs have been materially shortened by shortening the distance; for example, by the establishment of the Hell Gate Bridge route, by the opening of the Cascade Tunnel on the Great Northern and similar improvements.

The article also contains data concerning fast runs in Europe, starting off with the Great Western train which runs 77.3 miles between London and Swindon in 70 minutes. Several other runs are noted in England and France almost equal to this. Notes are given concerning long non-stop runs. The Flying Scotsman of the London & North Eastern between London and Edinburgh, 393 miles, in 8¼ hours, heads the list.

Central of New Jersey 100 Years Old

The Elizabethtown & Somerville Railroad Company, proprietor of that part of the Central of New Jersey which was first built, was chartered by the Legislature of New Jersey on February 9, 1831, so the time has arrived for the celebration of the Central's centenary. The New York-Jersey City ferry boats recognized the day (Monday) by flying flags, but there was no other outward demonstration. The line of road defined by the original charter was from Elizabethtown (now Elizabethport) on New York Bay, westward through Westfield, Plainfield and Bound Brook to Somerville, 25 miles. The first train was run from Elizabethtown to Plainfield on January 1, 1839. The track was made of strap rail. Business was started with one locomotive weighing nine tons, one 8-wheel passenger car and four small box cars.

Connection was made with New York City by means of the Elizabethport & New York Ferry Company. The railroad was extended from Plainfield to Somerville in 1840. In 1846 it was sold under foreclosure; in 1847 a charter was granted for the Somerville & Easton, providing for the extension westward to the Delaware River, and in 1849 the legislature authorized the amalgamation of the two companies into the Central Railroad Company of New Jersey. John Taylor Johnston, the first president of the Central of New Jersey, served until 1876. William G. Besler, now chairman of the Board, came to the service of this company in 1902, was appointed president in 1914, and was succeeded as president by Roy B. White in 1926.

The later extensions of the Central eastward across Newark Bay to Jersey City and westward, by the acquisition of the Lehigh & Susquehanna, to Scranton, and in other directions have brought it up to a system of 691 miles at the present time.

Negotiations for consolidation with the Delaware, Lackawanna & Western were begun about 1872 but fell through.

Grain Rates in Maritimes

The Board of Railway Commissioners at Ottawa last week rejected the application of the legislative committee of Nova Scotia Legislature for an order requiring the railways to lower the freight rate on grain and grain products for domestic consumption. The Board did not agree with the maritime position that the railways erroneously interpreted the Board's order of 1922 which established arbitraries to be incorporated in the railway rate structure.

Inasmuch as it was upon this basis that the Nova Scotia representatives made their claim, the Board dismissed the application with the rider that it would be prepared to give consideration to a request for decreased rates on these commodities should such be presented in accordance with procedure laid down for the presentation of such cases.

The maritimers took the stand that, when the general rate structure of the Canadian railways was revised ten years ago, certain arbitraries were incorporated in that structure by order of the Board, these arbitraries covering a variety of commodities. They held that it was the intention of the Railway Commission that grain and grain products, for cattle-feeding purposes, should be included in the lower schedules resulting from the inclusion of the arbitraries. During the war, the railways had gradually increased freight rates as emergency measures and the 1922 order of the Board restored them, in general, to where they stood prior to the increases. Grain and grain products, however, had not been brought within those decreases by the railways, so that the maritime farmers were continuing to pay freight rates for these commodities on the basis of the old war-time arbitraries.

In reply to the discussions looking to a greater use of maritime coal by the Canadian National, R. C. Vaughan, vice-president in charge of the purchasing of the railway, has issued a statement which follows in part:

"In 1930 the Canadian National Railways purchased 1,500,000 tons of Nova Scotia and New Brunswick coal. It has agreed to use eastern Canada coal as far west as Ottawa and Brockville and some Maritime coal is also being used on the United States lines of the System. No railway, other than the Canadian National, is bringing Maritime coal even as far west as Montreal, relying on the less costly imported fuel.

"The fuel purchases of the Canadian National from Canadian mines in the east and the west amount to approximately 3,000,000 tons per year. The coal used on the Atlantic Region is, of course, exclusively drawn from the mines in the Maritime provinces, and, in addition, the Canadian National is using 800,000 tons of Eastern Canadian coal each year at points west of Levis, in pursuance of the policy of the company to encourage Canadian industry.

"Every ton of this Canadian coal which is used at Levis, Montreal and points west, increases the operating charges of the railway. If we were buying coal on a strictly competitive basis it would be much cheaper to buy United States or British coal, which could be landed on railway lines, Levis and west, duty paid, under the cost of Canadian coal. As explained, our present policy is not to use imported fuel at any points east of Ottawa and Brockville, being desirous of doing everything that is reasonable to encourage Canadian production. The carrying out of that policy costs the Canadian National Railways hundreds of thousands of dollars per annum."

Texas Bill Would Bar Railways From Highways

A bill which would prohibit railroads in Texas from owning or operating motor coach or motor truck lines has been introduced in the legislature of that State, according to a recent dispatch from Austin to the United States Daily. The prohibition would be based on the Texas Anti-trust laws.

The title of the proposed measure defines it as bill to be an act:

Declaring the ownership of motor truck and motor bus lines by railroad companies to be contrary to the genius of free government and making it unlawful for railroad companies to own, control or operate any motor truck lines or motor bus lines for the carrying of freight or passengers for compensation or hire in this State:

Prohibiting the Railroad Commission of Texas from issuing any certificate of convenience and necessity to any railroad company to own, control or operate any motor truck lines or bus lines in this State;

Requiring railroad companies owning or operating motor truck or motor bus carriers to divest themselves of all right, title or interest in same within two years and requiring the Railroad Commission to cancel the certificates of convenience and necessity heretofore issued to any such company at the end of two years;

Prohibiting any railroad company, directly or indirectly or throughout any building company, from controlling, owning or possessing any motor carriers and requiring the Railroad Commission immediately to revoke certificates of convenience and necessity heretofore issued to such motor carriers.

Requiring the Attorney General to bring suit to enforce the provisions of the act providing that the State shall have the right of escheat of all property of motor carriers violating this act and making said remedy cumulative of the other remedies herein provided.

Forbidding the owners, officers, directors or stockholders in any railroad company or motor carriers first consenting to or assisting in any violation of this act and prescribing a penalty for such violation.

Making it the duty of railroad companies and motor truck and bus companies to furnish information to the Railroad Commission relative to the provisions of this act.

Providing that moneys, property, or other things of value received by any railroad company from any motor carrier, directly or indirectly, shall be prima facie evidence of the violation of this act and conferring the power and privileges of Title 126, Revised Civil Statutes, 1925, upon the Attorney General and district and country attorneys for the enforcement of this act.

Declaring an emergency.

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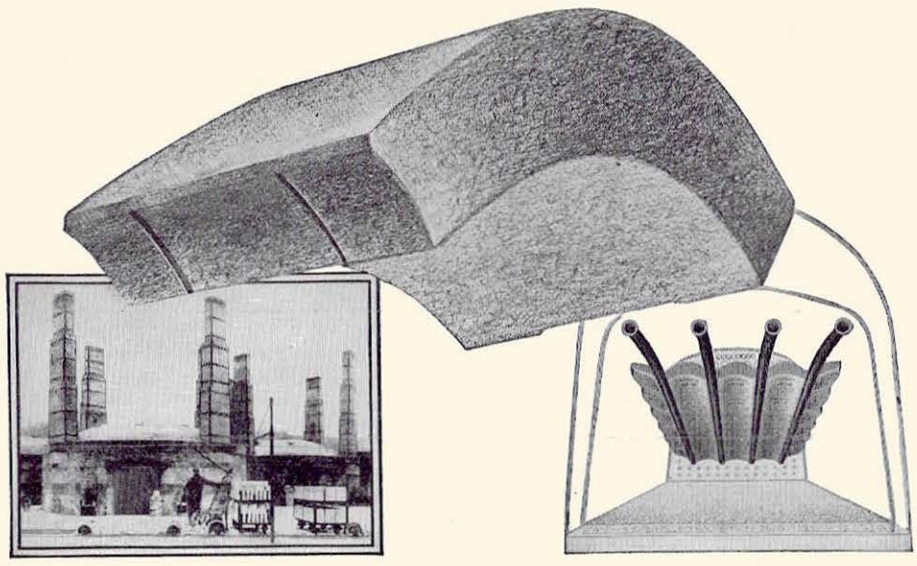
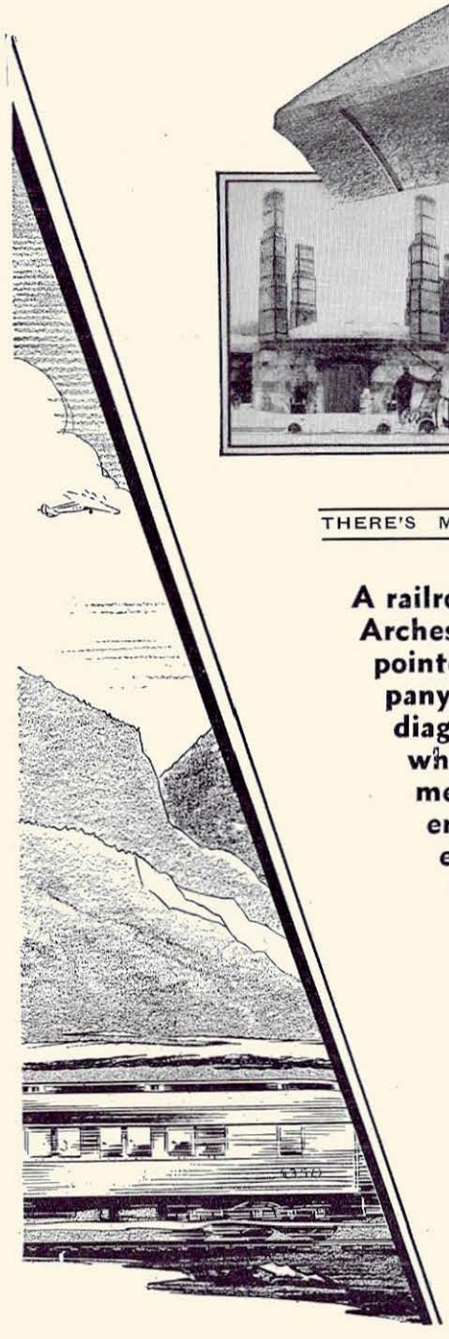
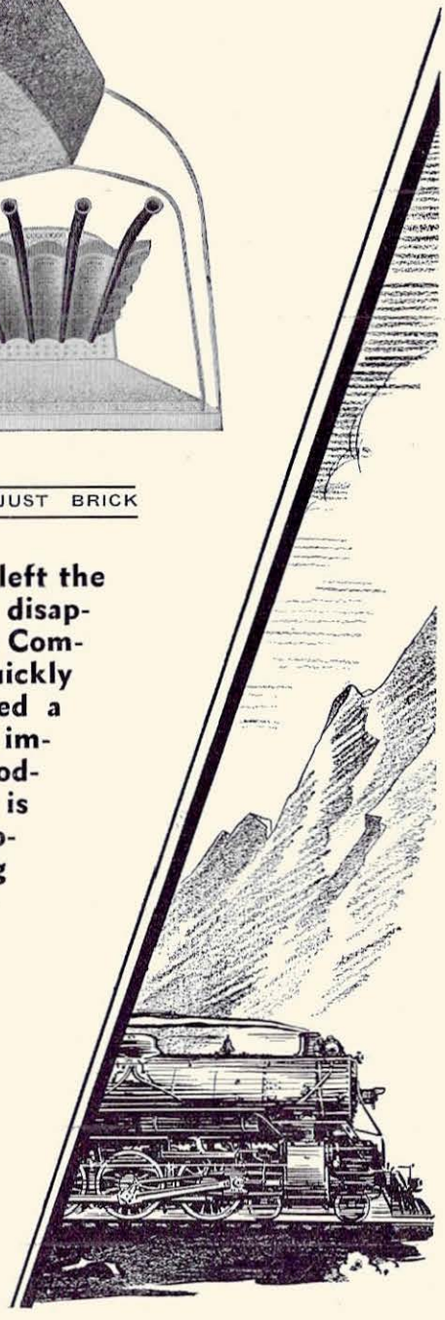
Keep your ARCHES up-to-date



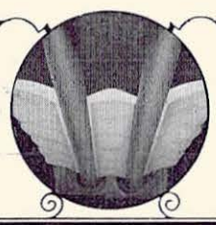
THERE'S MORE TO SECURITY ARCHES THAN JUST BRICK

A railroad modernized its stokers but left the Arches the same and naturally was disappointed in results. • • American Arch Company engineers were called in, quickly diagnosed the trouble and designed a whole new Arch. • • The troubles immediately disappeared and the modernized engines are doing what is expected of them. • • The locomotive Arch is an engineering specialty that must be carefully designed for the particular conditions encountered. Designing is one of the many important services rendered the railroads by American Arch Company.





Harbison-Walker Refractories Co.
Refractory Specialists



American Arch Co.
INCORPORATED
Locomotive Combustion
Specialists

Foreign

Swedish Railways to Electrify 372 Miles of Line*

Sweden plans to have one of the largest electrified railway nets in the world by 1934, or a total of more than 1,100 miles. The Riksdag, or national Parliament, has just authorized the royal railway board to proceed with the planned electrification of the main trunk line from Stockholm to Malmö, in southernmost Sweden, a length of 600 kilometers, or 372 miles. The work will involve some 70,000,000 kronor, or almost $20,000,000.

As an initial step in this ambitious undertaking the railway board, whose head is Axel Granholm, has contracted for the construction of 96 electric locomotives and six transformer stations. The order, placed with the Swedish General Electric Company, of Vesteras, runs close to 13,000,000 kronor. At the same time the railroad administration has ordered from the Swedish Metal Works Company 2,000 tons of copper wire, valued at about 3,000,000 kronor.

The electrification of this line will reduce the running time of the through trains from Stockholm to Berlin by at least one hour. At the same time the railway authorities have improved the ferry service between Trelleborg, in southern Sweden, near Malmö, and Sassnitz, in Germany, by building a new ferry boat of ice-breaking type, so as to overcome adverse weather conditions. This service is now more than 20 years old, having been inaugurated in 1909. Every day four trips are made, two in each direction, by the two Swedish and two German ferries. The Swedish boats measure 6,000 tons and are capable of carrying an entire train. They are also provided with dining service, smoking rooms and cabins like ocean liners.

Sweden already has one of the largest electrified railway nets in Europe, a total length of more than 750 miles. The trunk line between Stockholm and Gothenburg, completed in 1926 at a total expense of 42,000,000 kronor, accounts for 285 miles, and the so-called Iron Ore Line, in Lapland, the northernmost in existence, has a mileage of 265. The latter was partly completed in 1915 and is used for the transportation of iron ore from the Swedish Arctic mines to the shipping ports. Each year between 7,000,000 and 9,000,000 tons of ore are hauled over it. In addition to these government-owned lines, Sweden has about 200 miles of privately-owned electrified railways.

Since the electrification of the Stockholm-Gothenburg line, an annual saving of 115,000 kronor has been effected, and an additional 600,000 kronor have been saved due to the reduction of two hours in the running time. Now that the Riksdag has accepted the electrification plan of the Stockholm-Malmö line, the Swedish government water power board will build a new power station which will be ready by 1934. Additional power will be supplied by the privately owned Sydsvenska Kraft Aktiebolaget, which operates an extensive net in southern Sweden.

* An article prepared by Holger Lundbergh, American-Swedish News Exchange, Inc., through the courtesy of the Travel Information Bureau of the Swedish State Railways, 551 Fifth Avenue, New York.

Combination Rail-Highway Vehicle Developed in Britain

A combination motor vehicle interchangeable for operation on either rails or highways has recently been developed in Great Britain. The vehicle, designated "Ro-Railer" and manufactured by Karrier Motors, Ltd., was recently tested on a branch line of the London, Midland & Scottish. These tests were conducted with a vehicle having a motor coach body. In the accompanying illustration, it will be seen, the vehicle is fitted with a tractor body; thus the "Ro-Railer" is designed for both passenger and freight service on light traffic branch lines.

The vehicle is so constructed that the change from rail to highway operation or vice versa may be effected at any level crossing; only two or three minutes are required for this change. When the vehicle is on the highway the flanged wheels are locked concentrically to the road wheels but, being of small diameter, these rail wheels are clear of the road wheels and of the rail when the vehicle runs onto the crossing for a change from highway to rail operation. As the vehicle leaves the highway to proceed by rail its weight is transferred from the highway wheels to the rail wheels as the former leave that portion of the railway which has been built up to the level of the highway.

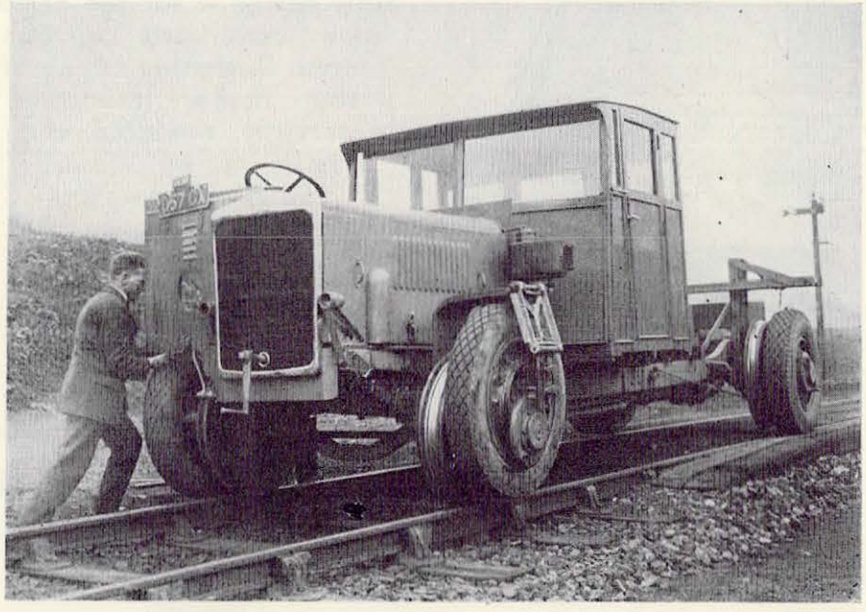
The highway wheels are so fitted that the driver by the turn of a lever may raise them clear of the rail level and lock them to the chassis. Thus, when the "Ro-Railer" is operating on rails, only the flanged wheels revolve while the railway wheels remain locked in position. For a return to the highway the operation is reversed.

Spanish Railway System to be Reorganized

In an attempt to solve some of the problems which confront the Spanish railway system, the government has decided upon a plan of simplification and unification of the existing railway regime, according to a report received in the Department of Commerce. To this end a Royal Decree was issued recently dissolving the present Superior Railway Council and providing for its immediate reorganization upon a more concrete basis.

Under the new form of organization the Superior Railway Council will be dependent upon the Ministry of Public Works and will be composed of the following: A president appointed by Royal Decree, upon the nomination of the Minister of Public Works; eight State representatives, including one jurist, and four engineers named by the Minister of Public Works, and one economist named by the Treasury Department; eight representatives composing a joint delegation of concessionnaires of railways which adhere to the national railway regime; one representative of laborers and agents, appointed by labor organizations, and three representatives appointed by the Minister of Public Works, who will represent commercial, agricultural and industrial interests. A general Secretary, with voice but without vote, will be appointed by the Council itself. The Council members will be appointed to serve four years, and may be re-elected.

The State's delegates in the Council and the members representing agricultural, commercial and industrial interests may not be counselors, managers, advisers, nor employees of any of the railway companies adhering to the railway regime, nor may they have contractual agreements



The "Ro-Railer" with Tractor Body

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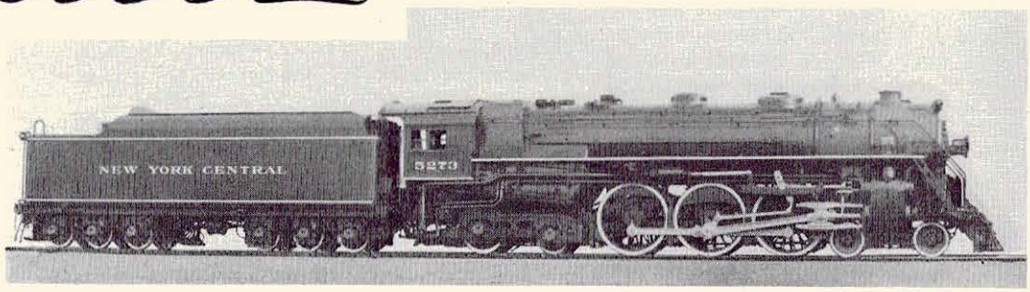
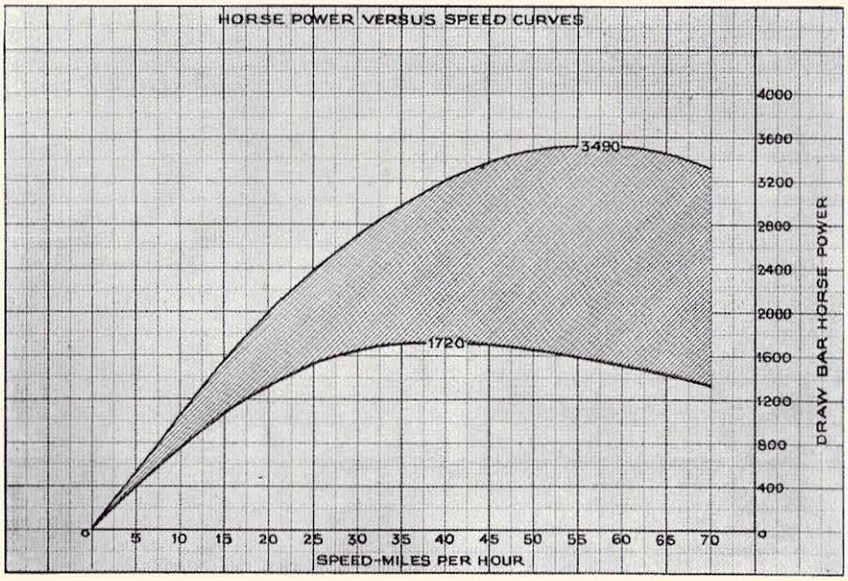
Alco Built



Weight on Drivers, 188,500 pounds; Weight of Engine, 351,000 pounds; Cylinders, 25 x 28 inches; Diameter of Drivers, 79 inches; Boiler Pressure, 225 pounds; Maximum Tractive Power with Booster, 53,200 pounds.



Curve shows horse-power versus speed for the modern Hudson Type as compared with the K-3 Pacific, the main passenger engine of six years ago on the New York Central Lines.

The Hudson type has approximately the same weight on drivers. The large increase in horse-power capacity, as represented by the cross-sectional area, indicates the possibilities available in modern power where weights are limited and higher track stresses are not permissible.

American Locomotive Company
30 Church Street New York N.Y.

with them nor hold any office in companies which perform work or services for them.

The reorganized Railway Council will function according to the provisions of Base 8 of the Royal Decree of July 12, 1929, except in matters relating to tariff, inspection of and intervention in management of companies, and in the issuance of railway bonds. Their functions in regard to tariff will be merely informative and consultative and in regard to the State railway debt they will be subject to whatever regulations may be dictated respecting it.

Among the most important reforms in the organization of the Superior Railway Council is the reduction which is to be effected in the technical and administrative personnel and in the budget expenses of the Council. The president of the Council will be required to submit to the Ministry of Public Works a plan of these reductions, and the latter will dictate the measures necessary to the constitution of the new Superior Railway Council in order that it may begin to operate at once. Once the Council is formed, it will draw up the regulations which are to govern its interior organization and submit these to the Minister of Public Works for approval.

Equipment and Supplies

LOCOMOTIVES

THE WESTERN PACIFIC is inquiring for 10 Mallet (2-8-8-2) type locomotives.

THE GOVERNMENT OF ECUADOR has ordered for the F. C. Quito Esmeraldas one 2-8-0 type locomotive from the Baldwin Locomotive Works. Miguel A. Albornoz is minister of the interior, Quito.

THE CHICAGO & ILLINOIS MIDLAND has ordered two 2-10-2 type locomotives and one 2-8-2 type locomotive from the Lima Locomotive Works. Inquiry for this equipment was reported in the *Railway Age* of October 25.

FREIGHT CARS

THE HOUSTON OIL TERMINAL COMPANY is inquiring for four or five tank cars for carrying asphalt of 10,000 gal. capacity.

THE WHEELING STEEL CORPORATION has given a contract to the Pressed Steel Car Company for making repairs to 15 hopper cars of 55 tons' capacity.

THE BYLLESBY ENGINEERING & MANAGEMENT CORPORATION has ordered two gondola cars from the General American Car Company. Inquiry for this equipment was reported in the *Railway Age* of January 17.

IRON & STEEL

THE GRAND TRUNK has ordered 15,000 tons of rails from the Illinois Steel Company.

THE BOSTON & MAINE has received bids on 130 tons of steel for work at Rochester, N. H.

THE CENTRAL OF NEW JERSEY has received bids for 1500 tons of steel for a viaduct at Hometown, Pa.

THE CANADIAN PACIFIC has taken bids on 1,535 tons of steel for bridges on its Moosehead division in Maine.

THE RICHMOND, FREDERICKSBURG & POTOMAC has ordered 3,500 tons of 130-lb. open hearth steel rail to be rolled at the Sparrows Point mill of the Bethlehem Steel Company.

THE NEW YORK, CHICAGO & ST. LOUIS has ordered 27,400 tons of rails dividing the order equally among the Carnegie Steel Company, the Bethlehem Steel Company, the Inland Steel Company and the Illinois Steel Company.

THE DELAWARE, LACKAWANNA & WESTERN has ordered from the Phoenix Bridge Company 245 tons of structural steel, for a plate girder span to be erected in connection with the grade crossing elimination work at Painted Post, N. Y. An order has been given to the American Bridge Company for 120 tons of structural steel for the grade crossing work at Kanona, N. Y.

THE PENNSYLVANIA has ordered 500 tons of steel for a produce terminal at Baltimore, Md., from Dietrich Brothers; orders for 530 tons for three bridges including one at Palmyra, Pa., and for 150 tons for a bridge at Philadelphia, have been let to the Bethlehem Steel Company. An order for 200 tons for a bridge at Schuylkill Haven, has been let to the Phoenix Bridge Company.

THE NEW YORK CENTRAL.—James Stewart & Co., Inc., the general contractor for the express highway on the west side of New York City between Fifty-ninth and Seventy-second streets, has let a contract for 14,000 tons of steel to the Fort Pitt Bridge Works to be used in this improvement; the New York Central has received bids on 185 tons of steel to be used in connection with grade crossing elimination work at Charlotte, N. Y.; Bates & Rogers Construction Company, general contractor, has given a contract for 130 tons of steel to the Harris Structural Steel Company for grade elimination work at Kilbourne, N. Y.

THE NORTHERN PACIFIC RAILWAY, Princeton University, Montana educational institutions, with various commercial clubs and business interests are planning to continue this year the geologic research work started last year near Red Lodge, Mont., on the northeastern border of Yellowstone National Park. Plans have been made for the building of summer homes and the setting up of a geological center five miles southwest of Red Lodge.

Supply Trade

A. N. Willsie, of the **Badeker Manufacturing Company,** Chicago, has been elected president of that company succeeding **B. R. Alley,** resigned.

The Truscon Steel Company, Youngstown, Ohio, has moved its Minneapolis, Minn. offices from 611 Metropolitan Bank building to 344 Baker building.

The Corley-DeWolfe Company, Elizabeth, N. J., has appointed the **Great Lakes Supply Company,** Chicago, its agent for railroads and industries in that district.

Ray V. Clute, who has been associated with the **Weyerhaeuser Sales Company** since 1916, has been appointed manager of cedar pole sales, with headquarters at Chicago.

W. W. Hancock, formerly vice-president of the **Donner Steel Company** has been appointed secretary of the **Republic Steel Corporation,** Youngstown, Ohio, to succeed **Richard Jones, Jr.**

R. M. Chester has been appointed general sales manager of the **Neely Nut & Bolt Company.** Mr. Chester's headquarters are in the general offices of the company at Pittsburgh, Pa.

Crawford P. McGinnis, of **The Pyle-National Company,** Chicago, has been appointed district sales manager of the Pacific Coast territory, with headquarters in the Hobart building, San Francisco, Cal.

Ward G. Day, district manager of the **Fairmont Railway Motors, Inc.,** Fairmont, Minn., with headquarters at New Orleans, La., has been transferred to 1218 Olive street, St. Louis, Mo., succeeding **Lee R. Payton,** deceased.

W. Newton Jeffress, Inc., railway specialties and supplies, has moved his headquarters from the National Press building, to the Woodward building, Fifteenth and H streets, N. W., Washington, D. C.

Porter Hurd, Packard building, Philadelphia, Pa., has been appointed representative of the **Illinois Testing Laboratories, Inc.,** Chicago. Mr. Hurd's territory includes eastern Pennsylvania, southern New Jersey, Delaware and Maryland.

Chester G. Cummings, for a number of years associated with the New York office of the **Sullivan Machinery Company,** with headquarters at Syracuse, N. Y., has been appointed manager of the branch office in the Rockefeller building, Cleveland, Ohio, vice **R. T. Stone,** resigned.

Roy E. Greenwood, formerly associated with the Simonds Saw & Steel Company, has been appointed assistant general manager of sales of the **American Chain Company, Inc.,** and associate companies, Bridgeport, Conn. Mr.

Continued on Next Left Hand Page

Hours or Weeks

Across the limitless plains where faithful squaws once dragged the creaking travois, Gary Wrought Steel Wheels now click off in an hour the Indian's journey of a week.

U S STEEL

Illinois Steel Company

Subsidiary of United States Steel Corporation

General Offices: 208 South La Salle Street, Chicago

Greenwood will have his headquarters at Bridgeport.

William L. Brown, formerly Philadelphia district sales manager for the Industrial Works, Bay City, Mich., and its successor, Industrial Brownhoist Corporation, Cleveland, Ohio, has opened an office at 1600 Arch street, Philadelphia, Pa., to act as special agent for the sale of railroad specialties and cranes.

J. A. Miller, general manager of sales of the **Vanadium Corporation of America,** has been appointed assistant to president, Pittsburgh district, with headquarters at Pittsburgh, Pa.; **Gustav Laub,** assistant general manager of sales, succeeds Mr. Miller as general manager of sales. Mr. Laub's headquarters are at New York.

The American Hoist & Derrick Company, St. Paul, Minn., the **Dominion Bridge Company, Ltd.,** and the **Dominion Engineering Works, Ltd.,** Montreal, Que., have formed the **Dominion Hoist & Shovel Company, Ltd.,** a subsidiary company, to manufacture and sell the products of the former company in Canada and the British Empire.

H. C. Beaver, formerly executive vice-president of the Rolls-Royce of America, has been appointed a vice-president of the **Worthington Pump & Machinery Corporation,** New York. Mr. Beaver will devote his time principally to the administration of the sales department. **E. E. Yake** has been promoted to vice-president to direct manufacturing and engineering as formerly.

Bethlehem Steel Acquires McClintic-Marshall Corporation

The Bethlehem Steel Company has acquired the business and properties of the McClintic-Marshall Corporation; this was effected by the issuance of notes and common shares of the Bethlehem Steel Corporation. Bethlehem, in payment gave 240,000 shares of its common stock which are now in the company's treasury and $8,200,000 of 4½ per cent serial notes maturing in ten equal series annually, beginning January 1, 1932. It also assumed the liabilities of the McClintic-Marshall Corporation including $12,000,000 of bonds outstanding. The price paid for the McClintic-Marshall business on the basis of recent quotations is about $33,000,000, of which $12,000,000 represents the bonded indebtedness of the McClintic-Marshall Corporation. The purchase price does not include other liabilities of the McClintic-Marshall Corporation.

G. H. Blakeley, vice-president of the Bethlehem Steel Company, now becomes president of the McClintic-Marshall Corporation. He has been for many years a prominent figure in the field of structural engineering. Mr. Blakeley was born on April 19, 1865, at Hanover, N. J., and was graduated from Rutgers College in 1884 with the degree of bachelor of science. He also has the degree of civil engineer awarded in 1894 and that of doctor of science in 1924. From 1884 to 1886 he was engaged in field engineering but had early decided to specialize in bridge construction and structural steel work. He was for one year engineer of the Riverside Bridge Company, Paterson, N. J., and for two years assistant engineer of the Erie Railroad in charge of bridge construction. In 1890 he became chief engineer of the Passaic Rolling Mill Company and during this service constructed many large railroad and highway bridges including the swing bridge over the Harlem river at 125th street, New

G. H. Blakeley

York. He also took an active part in the development of the modern type of riveted bridges and in the present type of steel skeleton construction for high buildings. He is the author of a handbook published in 1897 which contained much new and original information on structural steel. Mr. Blakeley served as manager of sales of the Passaic Company from 1902 to 1905 and also had charge of mechanical engineering, devoting considerable study to the subject of rolling mill methods and the rolling of shapes. In 1906 Mr. Blakeley went to the Bethlehem Steel Company to work in collaboration with the late Henry Grey in the development of Grey's process mills, which resulted in developing the broad flange Bethlehem beam. He was manager of the structural steel department from 1908 to 1927. As a result of his work, he was appointed vice-president of the Bethlehem Steel Company in 1927, in entire charge of the structural steel operations of the company.

Air Reduction Company Annual Report

Net earnings of $5,250,379 after all charges including Federal taxes were reported by the Air Reduction Company for the year ending December 31, 1930, according to the annual report issued February 9. The foregoing 1930 earnings compare with a 1929 figure of $5,-972,996.

The 1930 net earnings were equivalent to $6.32 per share on the 830,435-3/5 shares of the company's stock outstanding at the close of last year. This compares with $7.75 per share earned in 1929 on the 770,402-3/5 shares outstanding at the close of that year. The balance sheet as of December 31, 1930, lists total current assets of $18,500,597 as against current liabilities of $1,085,662. Cash on hand and in banks is shown as $6,475,772, an amount which is nearly six times the total current liabilities.

The consolidated income report for the year ending December 31, 1930 follows:

Gross Operating Income	$19,515,133
Operating Expenses	12,330,024
Operating Income	7,185,109
Other Income	931,315
Net Income before Reserves	8,116,424
Reserves ($2,061,868—for depreciation of assets)	2,211,579
Net Profit before Federal Taxes	5,904,945
Federal Taxes 1930	654,566
Net Profit earned on Outstanding Stock	$5,250,379

OBITUARY

Albert M. Hicks, who was connected with the Hicks Locomotive & Car Company, Chicago, until his retirement in 1909, died in Taylorville, Ill., on February 5 from pneumonia.

Dr. John Lundie, president of the Lundie Engineering Corporation, New York, died on January 9 at his home in New York City after an illness of several weeks. Dr. Lundie was born on December 14, 1857, at Arbroath, Scotland. He was educated at the University of Edinburgh, where he received the degree of bachelor of science in 1880 and that of doctor of science in 1902. From 1873 to 1877 he was engaged in harbor work at Dundee, Scotland; from 1880 to 1884 in railroad work in Oregon and Washington, and then to 1890, in muni-

John Lundie

cipal work in Chicago. From 1890 to 1893 he was engaged in bridge work and then became engaged in private practice. He developed a method for determining the yield of artesian water areas during an investigation of the water supply system of Memphis, Tenn. He designed the first combined electric hoist and traveler (the Telfer), investigated and reported on the electrification of the Illinois Central, the Boston Elevated, the Brooklyn Elevated and Manhattan lines, New York, and also the Metropolitan Underground lines in London, England.

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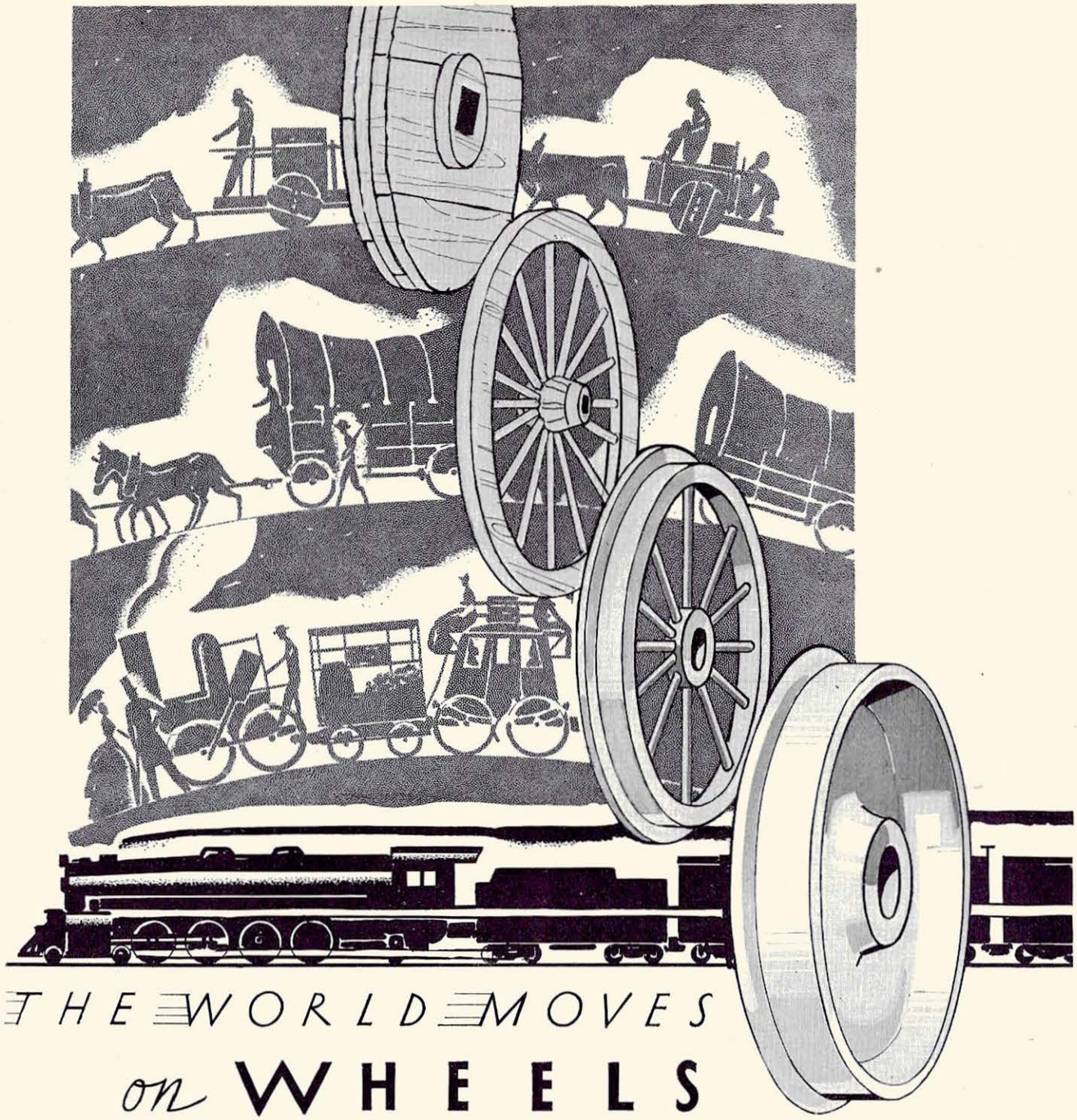

THE WORLD MOVES on WHEELS

From the time man discovered that a rounded object rolls with comparative ease and devised the first crude cart, he has ever been on the move. His means of conveyance have undergone vast changes. The slow joggle of the oxcart has given place to the swift flight of the express train, but never has the wheel been supplanted as the basic factor of transportation. Instead, it has become more vitally important than ever. The speed and weight of modern transportation throw a tremendous responsibility on wheels. Significant then is the fact that Carnegie Wrought Steel Wheels are considered the standard of excellence in today's exacting service. To serve even more efficiently, we are now prepared to furnish Rim-Toughened Wrought Steel Wheels. The process of heat treatment to which these wheels are subjected insures additional service out of all proportion to the small increase in cost. Our wheel engineers will be glad to discuss this matter with you further.

CARNEGIE WROUGHT STEEL WHEELS

Product of Carnegie Steel Company, Pittsburgh, Pa. U.S. STEEL *Subsidiary of United States Steel Corporation* 119

He investigated the cost of freight movement on the railroads of the United States Steel Corporation. He subsequently served as officer in charge of the Birmingham Southern, and then as vice-president and general manager of the Panama-American Corporation in Panama. He reported on the valuation of many railroad properties; enunciated principals of rapid acceleration in railway movement and the law of fluctuation in power stations, developed the Lundie formula for train resistance, and other devices including rheostats, tie plates and rail anchors. He was co-designer of the Lundie-Durham rail section. Dr. Lundie was a member of a number of technical societies in this country and in England including the American Society of Civil Engineers and the American Institute of Electrical Engineers.

W. H. Sauvage, vice-president of the Royal Railway Supply Company and president of the Sauvage Appliance Company, was shot and killed in his office at 90 West street, New York City, on February 5. According to the medical examiner's report on the case, Mr. Sauvage was shot by Andrew Lenahan, office manager of the same company, who was fatally wounded in his subsequent attempt at suicide. Mr. Lenahan died on his way to the hospital. Mr. Sauvage was well known in the railway supply business. He was born in February, 1872, at Pomeroy, Ohio, and was an engineer and an inventor of railway appliances. He had served as first sergeant from 1889 to 1892 in the Colorado National Guard. The greater part of Mr. Sauvage's business life had been connected with his own companies. He was the author of articles on power and hand brakes which were published in technical papers and magazines.

TRADE PUBLICATIONS

ELECTRIC ARC WELDING.—A handbook of 80 pages has been issued by Hobart Brothers Company, Troy, Ohio, which presents many facts on the uses and methods of electric welding. It also contains descriptions of electric welding materials and appliances manufactured by the Hobart company.

SPERRY RAIL DETECTOR.—An attractive and interesting bulletin of 16 pages has been issued by Sperry Products, Inc., Brooklyn, N. Y., which describes and illustrates in considerable detail the rail defect problem, the service offered by the Sperry Company, and the character and method of operating the Sperry rail flaw detector equipment.

SLIP RING MOTORS.—This is Bulletin 169 of the Wagner Electric Corporation, St. Louis, Mo. The bulletin discusses in detail the mechanical and electrical characteristics of slip ring motors, their ability to start smoothly at low current rates when starting heavy loads, the four different types of slip ring motors, their speed torque characteristics and control equipment necessary for starting these four types.

Construction

ATCHISON, TOPEKA & SANTA FE.—A contract has been let to Villadsen Brothers, San Francisco, Cal., for the construction of a one-story brick and steel shop building at Richmond, Cal.

ATCHISON, TOPEKA & SANTA FE.—This company and the Grand Trunk Western, the Indiana Harbor Belt, the Chicago River & Indiana, the Belt Railway of Chicago, the New York Central and the Chicago & Western Indiana have been authorized by the Illinois Commerce Commission to accept an ordinance passed by the City of Chicago for the separation of grades at Forty-seventh street and Archer avenue in that City. The ordinance also provides for the elevation of the tracks of the railroads other than the Santa Fe in the vicinity of South Central Park avenue and West Forty-ninth street to meet the grades of the Santa Fe elevation.

CANADIAN NATIONAL.—The City of Saskatoon (Sask.) has awarded a contract to the Carter-Halls-Aldinger Company, Winnipeg, Man., for the construction of a subway to carry Nineteenth street, Saskatoon, under the tracks of this company. The total cost of this project will be about $300,000.

CANADIAN NATIONAL.—This company is making tentative plans for the construction of a brick, concrete and stucco passenger station, 107 ft. by 27 ft., at Yarmouth, N. S.; for the construction of a new station at Newcastle, N. B., and for the provision of a new passenger station, freight house, and freight yard at Dalhousie, N. B. The erection of a modern fruit warehouse on the site of the old Great Western station at Esplanade and Yonge streets, Toronto, Ont., is also under consideration, while a contract has been awarded to the Stewart Construction Company of Sherbrooke, Que., for the construction, at a cost of $71,886, of a two-story addition, 148 ft. by 43 ft., to its station at Levis, Que., to replace a portion of the original building recently destroyed by fire.

CANADIAN NATIONAL.—A contract has been let to the W. H. Yates Construction Co., Ltd., Hamilton, Ont., for the construction of subways to carry Richmond and Wellington streets, London, Ont., under the C. N. R. tracks. This work is in connection with that road's general 16-year program of grade separation and terminal improvement at London, to be carried out on the basis of an agreement with the city government, as reported in the *Railway Age* of February 1, 1930, page 361. Both subways will be of reinforced concrete, about 66 ft. wide between abutments, and both will carry 12 tracks. They will be completed by December 31, 1931, at a cost of slightly over $1,000,000. Rearrangement of tracks to serve a new passenger station and to conform to the new grade of the subways will also be constructed by company forces during 1931, at an estimated cost of $150,000. During 1932, a new station will be erected to serve both the Canadian National and the London & Port Stanley, at an estimated cost of approximately $500,000. Detailed plans for this station have not yet been completed. No further grade separation work under the agreement is called for until 1937, and will be carried out then only if the city requests. A contract has also been awarded to A. J. McDonell & Co., Montreal, Que., for the construction of a concrete subway, 61 ft. wide, to carry Canardiere road, Quebec, Que., under three Canadian National tracks at the entrance to Limoilou yard.

CANADIAN PACIFIC.—A contract has been awarded to E. P. Muntz Co., Toronto, Ont., for the substructure and part of the superstructure of a subway to carry Lansdowne avenue, in the northwestern part of Toronto, under the Canadian Pacific and Canadian General Electric Company industrial tracks. The subway will be 66 ft. wide and the superstructure will carry four railroad tracks. The Board of Railway Commissioners of Canada have issued an order authorizing the city of Windsor, Ont., to build a subway carrying Ellis avenue under eight Canadian Pacific tracks and one track of the Essex Terminal.

CHICAGO, BURLINGTON & QUINCY.—A contract has been awarded by the Iowa State Highway Commission to the Jensen Construction Company, Kimballton, Iowa, for the construction of a viaduct to carry State Road No. 169 over the tracks of this company at Afton, Iowa. The cost of this structure will be about $30,000.

DELAWARE & HUDSON.—The Public Service Commission of New York has approved specifications and an estimate of cost amounting to $113,235 for elimination of a grade crossing on the Cambridge-Salem state highway, Cambridge, N. Y.

ERIE.—The Public Service Commission of New York has designated for elimination the Nanticoke avenue and Liberty street crossings of this company's tracks in Endicott, N. Y. The Nanticoke avenue crossing is to be eliminated by building a street subway at an estimated cost of $204,000, and the Liberty street crossing will be closed.

GREAT NORTHERN.—The general contract for the construction of the superstructure of a steam-operated electric power plant at Great Falls, Mont., has been awarded to Peppard & Fulton, Minneapolis, Minn. The complete cost of the plant will be about $80,000. Bids have been asked for the construction of the superstructure of a power plant at Williston, N. D., which will cost about $80,000.

LOUISVILLE & NASHVILLE.—A contract for the construction of grade separation structures at Eighteenth and Twentieth streets, Birmingham, Ala., has been let to the Southern Construction Company, Birmingham, at a cost of about $260,000.

NEW YORK CENTRAL.—Two important contracts recently awarded by this company in connection with its general program of development on the West

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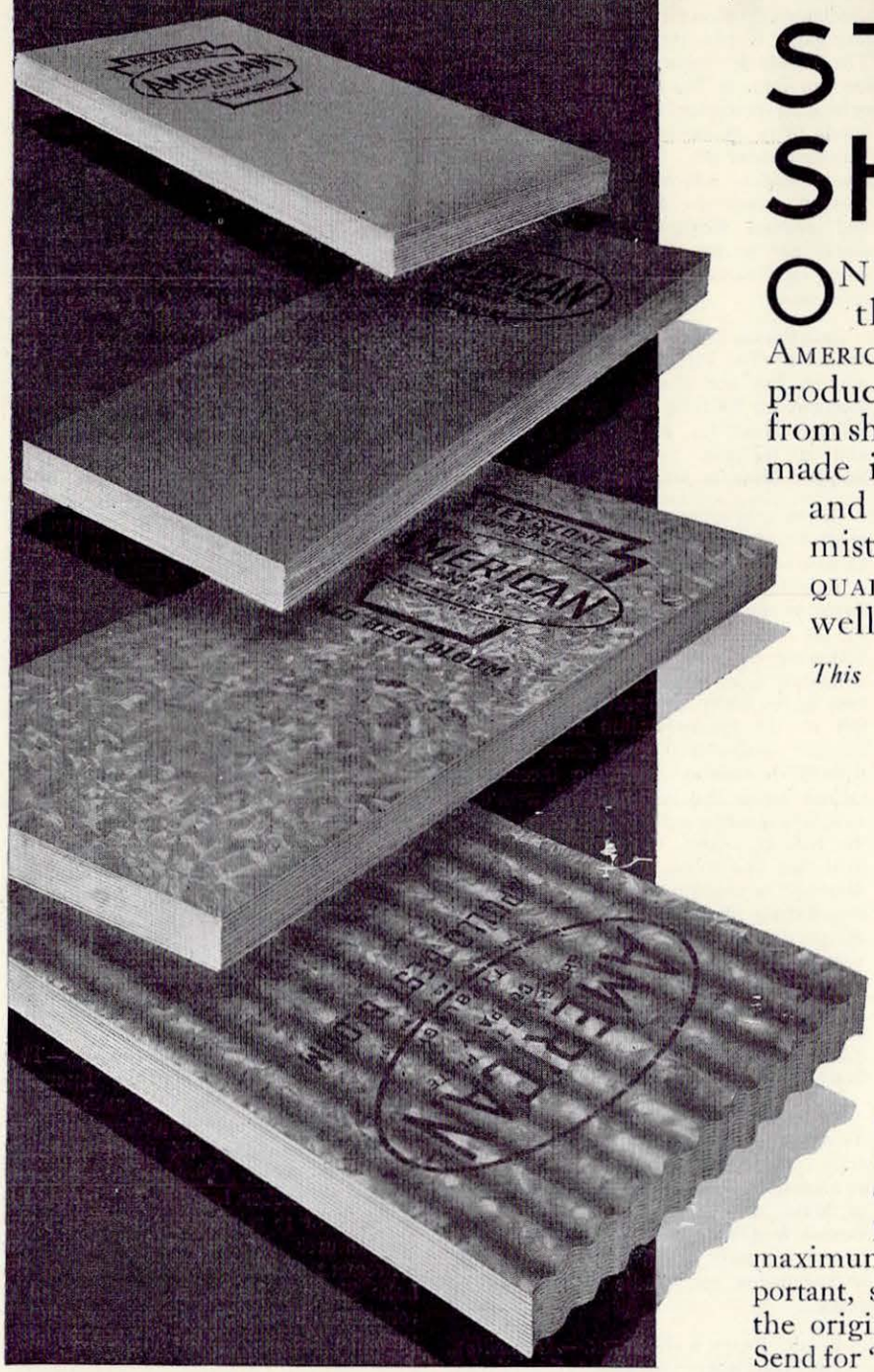
AMERICAN STEEL SHEETS



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AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY
CARNEGIE STEEL COMPANY
COLUMBIA STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPB'LDG. & DRY DOCK CO.
ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY
OIL WELL SUPPLY COMPANY
THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & RAILROAD CO.
UNIVERSAL ATLAS CEMENT COMPANY

Pacific Coast Distributors—Columbia Steel Company, Russ Building, San Francisco, Calif.
Export Distributors—United States Steel Products Company, 30 Church Street, New York, N. Y.

Side of New York City are as follows: For the erection of the superstructure of an elevated public highway between West Fifty-Ninth and West Seventy-Second streets, to James Stewart & Co., Inc., New York City; and for the construction of foundations for city structure No. 4, an extension of the same elevated highway, between West Seventy-Second and West Seventy-Ninth streets, to H. H. Sherwin & Co., Inc., New York. Contracts have also been awarded to the Walsh Construction Co., of Syracuse, N. Y., for the elimination of Buckhout's crossing in Briarcliff Manor, N. Y., and to H. R. Beebe, Inc., Utica, N. Y., for the reconstruction of bridge U-43, Prospect, N. Y. The Public Service Commission of New York has approved plans and estimates of cost for work in connection with the elimination of a New York Central grade crossing on the West Junius-Waterloo highway south of Junius station, Phelps, N. Y., and of the Wende crossing, Alden, N. Y.

PENNSYLVANIA.—The New York Public Service Commission has designated for elimination the Jamison road crossing of the Pennsylvania on the Jamison-East Elma county highway, Elma, N. Y. The elimination will be accomplished by carrying the highway under the railroad at an estimated cost of $170,000.

RICHMOND, FREDERICKSBURG & POTOMAC.—This company has begun the construction of a reinforced concrete bridge to carry a double-track line over a diversion channel of Chappawamsic creek. The work, which is to be done by company forces at a cost of about $50,000, is in connection with improvements being carried out by the United States Navy Department in the construction of a Marine Corps flying field.

SOUTHERN PACIFIC.—A contract for the construction of a highway subway under the tracks of this company at Seventh street, Oakland, Cal., has been awarded to J. F. Knapp, Oakland, at a cost of about $125,000. The County of Santa Cruz has awarded a contract to C. C. Gildersleeve, Napa, Cal., for the construction of a steel viaduct with concrete floor over the tracks of this company near Felton, Cal., at a cost of about $25,000.

TEMISKAMING & NORTHERN ONTARIO.—This company plans to proceed during 1931 with the construction of its James Bay extension. In 1930 new line was built from Coral Rapids, Ont., to Moose River, and during the coming summer work will be undertaken from this point to tidewater at Moose Factory, 45 miles. As reported in the *Railway Age* of August 30, 1930, page 466, the contractors for this extension are H. F. McLean Co., Toronto, Ont., while the Hamilton Bridge Co., Ltd., Hamilton, Ont., is to build the superstructure of the Moose River bridge, now under construction. Plans for the railway terminal and a town site to be controlled by the railway on James Bay are now under consideration by the Temiskaming & Northern Ontario Railway Commission and the government of the province of Ontario.

Financial

BALTIMORE & OHIO.—*Bonds.*—The Interstate Commerce Commission has authorized this company to issue $2,728,000 of refunding and general mortgage, series D, bonds and a like amount of Toledo-Cincinnati division first lien and refunding mortgage 6 per cent, series C, bonds. The Toledo & Cincinnati has been authorized to issue a like amount of first and refunding mortgage 6 per cent, series C, bonds to be pledged under the B. & O.'s Toledo-Cincinnati division mortgage, bonds under which latter are to be pledged under the B. & O.'s refunding and general mortgage. The series D bonds are to be pledged and repledged from time to time in security for short term notes.

BRIMSTONE RAILROAD & CANAL.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon an 0.8-mile line extending from Sulphur Mine, La., to Brimstone Junction and a 6.7-mile line extending from Sulphur Mine to Mossville.

BUTTE, ANACONDA & PACIFIC.—*Government Recovers After I.C.C. Reversal.*—The Department of Justice has announced that a judgment for $487,000 and interest in favor of the government has been entered by the federal district court in Montana following decision by that court that the Interstate Commerce Commission was correct in its latest interpretation of section 204 of the transportation act providing for the reimbursement of short lines for deficits in railway operating income incurred during that part of the federal control period when such roads were not under federal control. The commission first held that this word "deficit" applied to a decrease in income under private operation during this period as compared with the previous "test period," but later it reversed itself and held that a company was not entitled to reimbursement unless it had an actual operating deficit. The government brought suit to recover the amount paid to the B., A. & P. under the first construction.

CHESTER & BECKET. — *Abandonment.* — This company has applied to the Interstate Commerce Commission for authority to abandon its line from Chester to Becket, Mass., which has been operated by the Boston & Albany, on the ground that the quarry company which it serves has made arrangements to handle its freight by truck.

ELGIN, JOLIET & EASTERN.—*Acquisition.*—The Interstate Commerce Commission has authorized this company to acquire the Griffith & Northern, extending from Griffith, Ind., north and west to Shearson, 9.2 miles.

GULF, MOBILE & NORTHERN.—*Omits Dividend.*—This company has omitted its regular quarterly dividend of $1.50 on its preferred stock.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE. — *Abandonment.* — This company has applied to the Interstate Commerce Commission for authority to abandon its line from Birchwood to Reserve, Wis., 18.5 miles.

MONTANA, WYOMING & SOUTHERN.—*Tentative Recapture Report.*—The Interstate Commerce Commission has made public a tentative recapture report by Division 1 finding that this company has earned $257,399 of excess net income during the period 1920 to 1927, of which one-half is to be paid to the government.

MONTOUR.—*Final Value.*—The Interstate Commerce Commission has issued a final valuation report finding the final value for rate-making purposes to be $5,063,000 as of 1917.

NEW ORLEANS, TEXAS & MEXICO.—*Acquisition.*—Examiner H. C. Davis of the Interstate Commerce Commission has recommended in a proposed report that the commission authorize the acquisition by this company of control of the Rio Grande & Eagle Pass, which has a line from Laredo to Darwin, Tex., by purchase of its stock for $337,500.

NEW YORK CENTRAL.—*Acquisition.*—This company has filed with the Interstate Commerce Commission an application for authority to acquire control of the Chicago, Attica & Southern, a 120-mile line in Indiana, for $362,500, the amount fixed as the "commercial value" of the property by a board of arbitrators, or such other sum as the commission may approve, provided the commission still considers that it should be continued in operation. However, the company first asks the commission to consider whether it should not be released from the condition attached to the order in the New York Central unification case, requiring it to make an offer for the Attica road, among other connecting short lines, on the ground that the acquisition, involving an expenditure of $500,000 to $1,000,000 for its rehabilitation, would impose too great a burden on interstate commerce. The New York Central alleges that as a going concern the property has no commercial value.

NEW YORK CENTRAL.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue $75,000,000 of refunding and improvement mortgage 4½ per cent bonds, Series A, dated October 1, 1913, and maturing October 1, 2013. The purpose is to retire, or to reimburse the treasury for expenditures in connection with the retirement of $57,841,700 of bonds of the Lake Shore & Michigan Southern and to reimburse the treasury for capital expenditures to the amount of $17,158,300 since 1922.

NEW YORK CENTRAL.—*Equipment Trust Certificates.*—The Interstate Commerce Commission has authorized this company to issue $7,020,000 of its 4½ per cent equipment trust of 1930 certificates, maturing in installments from 1931 to 1945. The issue is authorized for sale to a syndicate headed by the Chase Securities Corporation at 102.06, making the average annual cost to the railroad approximately 4.17 per cent.

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The cylindrical solid steel terminal gives a large contact area and also enables the bond to be placed at any convenient angle. Installation can be made by either the oxy-acetylene flame with flux wire or by arcwelding with steel electrode. Write us for samples and detailed information.

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Type BW-2 for use on reinforced splice bars with widely projecting rib.
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AMERICAN STEEL & WIRE COMPANY

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PEARL RIVER VALLEY.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon the operation of 9.64 miles of line owned by the Goodyear Yellow Pine Company, from Crosby to Rowlands, Miss., because of the completion of logging operations.

PENNSYLVANIA.—*Bonds.*—The Interstate Commerce Commission has authorized this company to assume obligation and liability as guarantor and to sell $20,838,000 of bonds of subsidiary companies.

PENNSYLVANIA.—*Bonds.*—The Interstate Commerce Commission has authorized this company to sell to Kuhn, Loeb & Company at 98 an issue of $6,483,000 of Pennsylvania, Ohio & Detroit first and refunding mortgage 4½ per cent, series A, bonds. At the price named the average annual cost to the railroad will be approximately 4.6 per cent.

ST. LOUIS-SAN FRANCISCO.—*Acquisition.*—The Interstate Commerce Commission has authorized this company to acquire a 2-mile line of the Mississippi River Western extending from Victoria (Wilson), Ark., to Stoffles Landing.

SAN ANTONIO & ARANSAS PASS.—*Final Value.*—The Interstate Commerce Commission has issued a final valuation report as of 1919 finding the final value for rate-making purposes of the property owned and used for common-carrier purposes to be $17,950,000.

SOUTH GEORGIA.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon that part of its line extending from Perry, Fla., to Hampton Springs, 4 miles.

SOUTHERN PACIFIC.—*Abandonment.*—The Interstate Commerce Commission has authorized the New Mexico & Arizona, lessor, and the Southern Pacific, lessee, to abandon a 12.5-mile line extending from near Flux, Ariz., westerly to Calabasas.

WACO, BEAUMONT, TRINITY & SABINE.—*Receiver's Notes.*—The receiver of this company has been authorized to issue and renew from time to time $30,000 of not to exceed 6 per cent notes.

WASHINGTON RUN.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon its line extending from Star Junction, Pa., to Layton, 4.1 miles.

Dividends Declared

Canadian Pacific.—Common, $.62½, quarterly; Preferred, $2.00, semi-annually, both payable April 1 to holders of record March 2.

Chicago & North Western.—Common, $1.00, quarterly; Preferred, $1.75, quarterly, both payable March 31 to holders of record March 2.

Green Bay & Western.—5 per cent, payable February 9 to holders of record February 7.

New York, New Haven & Hartford.—Common, $1.50, quarterly; Preferred, $1.75, quarterly, both payable April 1 to holders of record March 6.

Average Prices of Stocks and of Bonds

	Feb. 10	Last week	Last year
Average price of 20 representative railway stocks.	95.65	93.33	135.88
Average price of 20 representative railway bonds..	94.28	93.49	92.50

Railway Officers

EXECUTIVE

C. J. Mansfield has been elected vice-president of the Prescott & North Western, with headquarters at Prescott, Ark.

W. N. Sangster has been elected vice-president of the Gulf & Northern, with headquarters at Houston, Tex., succeeding **J. W. Link**, resigned.

E. E. Fairweather, assistant general counsel of the Canadian National, has also been appointed general executive assistant, with headquarters at Montreal, Que.

O. T. Henkle, general manager of the Union Stock Yard & Transit Company, with headquarters at Union Stock Yard, Chicago, has also been elected vice-president.

Frank E. Clarity, who, until January 1, 1930, was vice-president and general manager of the Fort Worth & Denver City and the Wichita Valley, has been elected president and general manager of the Rapid City, Black Hills & Western, with headquarters at Rapid City, S. D.

J. H. North, acting general manager of the Hannibal Connecting at Ilasco, Mo., has been elected president and general manager with headquarters at Hannibal, Mo. **T. A. Fitzpatrick** has been elected vice-president, with headquarters at Hannibal.

FINANCIAL, LEGAL AND ACCOUNTING

J. H. Ward has been appointed assistant auditor of capital expenditures of the Illinois Central, with headquarters at Chicago.

H. A. Day has been appointed assistant land and tax agent of the Illinois Terminal System, with headquarters at Chicago.

Charles T. Leight has been appointed general auditor of the Western Maryland, succeeding **F. C. Uhlman**, deceased. Mr. Leight's headquarters will be located at Baltimore, Md.

C. F. Impey, assistant land commissioner of the Southern Pacific, has been promoted to land commissioner, with headquarters as before at San Francisco, Cal., succeeding **B. A. McAllaster**, retired.

E. L. Potter, auditor of miscellaneous accounts of the Atlantic Coast Line, has been appointed auditor of disbursements, succeeding **H. T. Fisher**, deceased, and **C. S. Foshee** has been advanced to auditor of miscellaneous accounts. **A. R. Hardwick** has been promoted to succeed Mr. Foshee as assistant auditor of disbursements.

OPERATING

Arthur Pidgeon has been appointed general superintendent of the State Belt Railroad, with headquarters at San Francisco, Cal., succeeding **J. H. Wasserburger**, who resigned on January 1.

H. R. Lake, superintendent of transportation of the Atchison, Topeka & Santa Fe System, has been appointed general superintendent of transportation, with headquarters as before at Chicago.

C. A. Russell has been appointed trainmaster of the Nebraska-Colorado division of the Chicago, Rock Island & Pacific at Fairbury, Neb., succeeding **Frank L. Park**, who has retired from active service.

William Conine, assistant trainmaster on the Elgin, Joliet & Eastern, has been promoted to trainmaster at Rondout, Ill., succeeding **T. J. Milligan**, who has been promoted to superintendent of the Joliet division, with headquarters at Joliet, Ill.

The jurisdiction of **Andrew Lester**, superintendent of the Louisiana Southern, with headquarters at New Orleans, La., has been increased to include traffic matters and industrial development. **J. D. Youman**, assistant to the president in charge of those two departments, has resigned.

E. C. Gegenheimer, trainmaster on the Philadelphia (Pa.) terminal improvements of the Pennsylvania, has been transferred to the Akron division, succeeding **E. S. McCormick**, who has been transferred to the Conemaugh division. Mr. McCormick succeeds **J. L. Pringle**, who has been appointed freight trainmaster of the Eastern division.

T. H. Crump, superintendent of the Kettle Valley, has been appointed superintendent of the Kettle Valley division of the Canadian Pacific, with headquarters as before at Penticton, B. C. **J. I. MacKay**, superintendent of the Nelson division, has been appointed superintendent of the newly created Kootenay division, with headquarters as before at Nelson, B. C. This appointment follows the consolidation of the Cranbrook, Nelson and Lake & River divisions as the Kootenay division. **A. J. Ironside**, assistant superintendent of the Cranbrook division, has been appointed assistant superintendent of the Kootenay division, with headquarters as before at Cranbrook, B. C.

B. E. Dewey, assistant superintendent of car service of the Pullman Company, has been promoted to superintendent of car service, with headquarters as before at Chicago, succeeding **Palmer L. Randall**, deceased. Mr. Dewey obtained his first railway experience in June, 1889, as a stenographer in the office of the Wagner Palace Car Company at Buffalo, N. Y. During the following 11 years he was advanced through various positions at Mackinaw City, Mich., and Grand Rapids, Houston, Tex., and Denison, St. Louis, Mo., and Buffalo, to and including

Continued on Next Left Hand Page

CASE-HARDENED PARTS NOW COST LESS

AGATHON NICKEL IRON
TRADE MARK

All three spring hanger pins were carburized for 8 hours, quenched in water and broken under a steam hammer. Note the toughness of the Agathon Nickel Iron.

AGATHON NICKEL IRON

Gives A Better Case At A Lower Cost

- Alloy irons and steels developed by Republic metallurgists are already improving the service of many car and locomotive parts.
- Now comes Agathon Nickel Iron to remove many case-hardening difficulties and reduce the cost of case-hardened parts.
- Not only does this material take a fine case but the core is unusually tough and uniform. There are no slag spots or seams and warping is almost negligible.
- With this improved material, pins and bushings may be machined to size, polished, carburized and quenched from the pot without spoiling the surface for smoothness.
- Grinding is unnecessary and the finished cost with Agathon Nickel Iron is lower.
- Wherever you use case-hardened pins and bushings try Agathon Nickel Iron.

Central Alloy Steel Division

REPUBLIC STEEL CORPORATION

MASSILLON, OHIO

that of assistant district superintendent at St. Paul-Minneapolis, Minn. When the Wagner Palace Car Company was acquired by the Pullman Company in 1900 Mr. Dewey was appointed agent at Minneapolis. Later he served successively as assistant district superintendent at Omaha, Neb., clerk in the office of

B. E. Dewey

the general superintendent at Chicago, second assistant superintendent of the Northwestern division, first assistant in the car service department, acting chief clerk to the vice-president and general manager and assistant superintendent of car service. His promotion to superintendent of car service became effective on January 16.

John D. Brennan, who has been promoted to superintendent of the San Joaquin division of the Southern Pacific, with headquarters at Bakersfield, Cal., has been in the service of that company for more than 28 years. He was born in California in October, 1876, and obtained his first railway experience as a fireman on the Central Pacific (now part

John D. Brennan

of the Southern Pacific), in 1892. From 1894 to 1902 Mr. Brennan served as a brakeman, yardman and yardmaster on various railroads, including the Northern Pacific, the Oregon-Washington Railroad & Navigation Company and the Union Pacific, then becoming a brakeman on the Coast division of the Southern Pacific. For the following 23 years he worked successively on the Coast division of the Southern Pacific as a brakeman, conductor, district trainmaster, traveling conductor and trainmaster. He was advanced to assistant superintendent of the Shasta division at Dunsmuir, Cal., in 1925, where he remained until 1927 when he was transferred to the Western division at Oakland Pier, Cal. Mr. Brennan's promotion to superintendent of the San Joaquin division became effective on January 1.

TRAFFIC

J. F. Cullen has been appointed general agent for the Mexican Railway at New York.

William A. Watson has been appointed foreign freight agent for the Canadian National at Chicago.

W. J. Coyle, commercial agent for the Chicago & Alton at Denver, Colo., has been promoted to general agent at that point.

W. A. Carlsen, general agent for the Minneapolis, St. Paul & Sault Ste. Marie, has been transferred from Chicago to Detroit, Mich.

J. G. Krener, assistant general passenger agent of the Western Maryland, has been promoted to general passenger agent, and **F. H. N. Heemann,** has been appointed assistant general freight agent. Both will have headquarters at Baltimore, Md.

W. R. Keikel, soliciting freight and passenger agent for the Missouri Pacific Lines at Brownsville, Tex., has been promoted to general agent of the freight and passenger departments at that point, succeeding **O. W. Williams,** who has been transferred to Fort Worth, Tex., where he replaces **H. G. Brower,** who has resigned.

C. E. Scott has been appointed general eastern agent of the St. Louis Southwestern, with headquarters at New York City, and **T. A. McDonough** has succeeded Mr. Scott as general agent at Pittsburgh, Pa. **W. E. Thompson,** general agent at Chattanooga, Tenn., has been transfered in the same capacity to Atlanta, Ga., succeeding Mr. McDonough, and **T. G. King** has been appointed general agent at Chattanooga.

ENGINEERING AND SIGNALING

John Robertson, division engineer of the Cranbrook division of the Canadian Pacific at Cranbrook, B. C., has been transferred to the Kettle Valley division, with headquarters at Penticton, B. C. **A. E. Stewart,** roadmaster on the Medicine Hat division at Bassano, Alta., has been promoted to division engineer of the Winnipeg Terminal division, with headquarters at Winnipeg, Man., succeeding **C. S. Moss,** who has retired from active service.

F. H. Hibbard, who has been appointed chief engineer of the Quebec Central, as announced in *Railway Age* of January 17, page 221, was born at Ottawa, Ont., on August 9, 1888. Mr. Hibbard entered railway service in October, 1907, as chainman on location with the National Transcontinental (now part of the Canadian National). Two months later he was appointed rodman at St. Malachie County, Que. In August, 1908, he was appointed leveller on location and in November of that year he became assistant engineer on construction at St. Anselme, Que. From 1909 to 1911, he served as assistant engineer on construction of the Quebec Bridge yard and construction of Quebec terminals. From 1911 to 1912, he was resident engineer, and in the latter year he became a partner in the firm of Thomas & Hibbard, contractors. From April to May, 1913, Mr. Hibbard was engaged as draughtsman on construction work with the Canadian Pacific and from May to June, 1913, he was engineer on construction of the Lake Erie & Northern (now

F. H. Hibbard

part of the Canadian Pacific). In June, 1913, he entered the service of the Quebec Central as engineer in charge of construction and in 1916 was appointed assistant engineer. In January, 1924, he was promoted to engineer, maintenance of way. In January, 1928, he became engineer, taking over the duties of chief engineer, general roadmaster and superintendent of bridges and buildings, and of engineer maintenance of way, which position he held until his recent appointment as chief engineer.

MECHANICAL

E. A. Shull, master mechanic of the Wichita Falls & Southern, has been appointed superintendent of motive power, with headquarters as before at Wichita Falls, Tex.

W. R. Sorel, locomotive foreman on the Canadian Pacific at Calgary, Alta., has been promoted to master mechanic of the Calgary division at the same point, succeeding **H. M. Allan,** who has been promoted to district master

Continued on Next Left Hand Page

IF

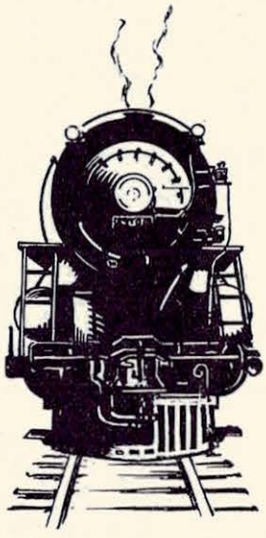
on 24 hour switch engine service, the coal in the tender gets beyond the working reach of the firemen and causes complaints, then equip your locomotives with FIREBARS.

There is no better way to insure

BETTER FIRES

which not only produce a better combustion but are saving as much as three tons of coal in a 24 hour period. It is that three tons that keep the fires thin, eliminate the smoke and lessen the fire cleaning.

AND THE COMPLAINTS WILL CEASE.



FIREBAR CORPORATION

CLEVELAND OHIO

FIREBAR

mechanic of the British Columbia district, with headquarters at Vancouver, B. C. **P. S. Lindsay,** assistant superintendent of the Nelson division, has been appointed master mechanic of the Kootenay division, with headquarters as before at Nelson, B. C.

W. O. Teufel, assistant master mechanic of the Pennsylvania at Altoona, Pa., has been promoted to master mechanic of the Erie & Ashtabula division at Mahoningtown (New Castle), Pa., succeeding **J. S. Richards,** who has been transferred to the Buffalo division at Olean, N. Y. **G. A. Rhoades,** general foreman on the Buffalo division at Oil City, Pa., has been promoted to assistant master mechanic of the Akron division at Akron, Ohio. **C. T. Hunt,** assistant master mechanic at Wilmington, Del., has been transferred to the Pittsburgh division at Conemaugh, Pa.

PURCHASES AND STORES

William F. Niehaus has been appointed assistant to the purchasing agent of the Missouri-Kansas-Texas, with headquarters at St. Louis, Mo. **R. H. King** has been appointed stationer, with headquarters at St. Louis.

OBITUARY

D. J. Evans, assistant superintendent of the Franklin division of the New York Central, died suddenly on January 28, from heart disease.

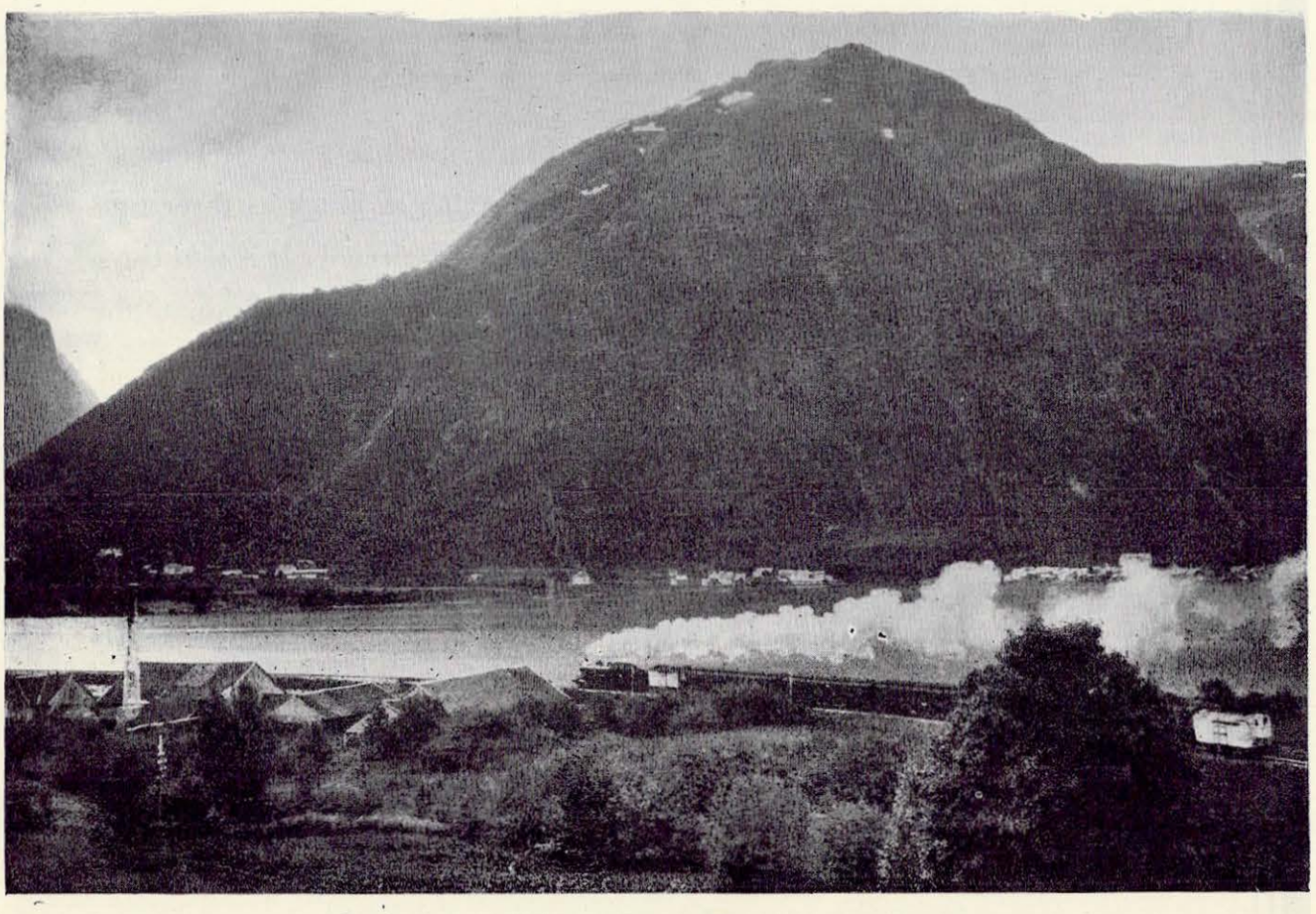
Delos W. Cooke, who was at one time vice-president of the Erie and until his death a director of the Baltimore & Ohio, died on February 10 at Phoenix, Ariz., following an operation for intestinal cancer and complications. He was 67 years old.

Richard Montfort, consulting engineer of the Louisville & Nashville, with headquarters at Louisville, Ky., since 1905, and for 18 years prior to that time chief engineer, died at Atlantic City, N. J., on February 7 at the age of 75 years. Mr. Montfort had been ill at Atlantic City for several months, following a fall in which he suffered injuries to his head.

George F. Stevens, assistant engineer of the Boston & Maine, with headquarters at the Billerica (Mass.) shops, died suddenly at his home at Kingston, N. H., on January 30. Mr. Stevens was born on January 17, 1873, at Haverhill, Mass., and received his education at the local public schools. He commenced his railroad service with the B. & M. on November 18, 1895, as an apprentice draftsman in the motive power department. Between the period 1901 to 1903 he served as assistant to the master mechanic at the Boston shops and in the latter year he became assistant to chief draftsman at Boston. In 1916, he was promoted to chief draftsman and in 1923 he became office engineer in the mechanical engineer's office. In 1927 he was advanced to assistant engineer, the position he held at the time of his death.

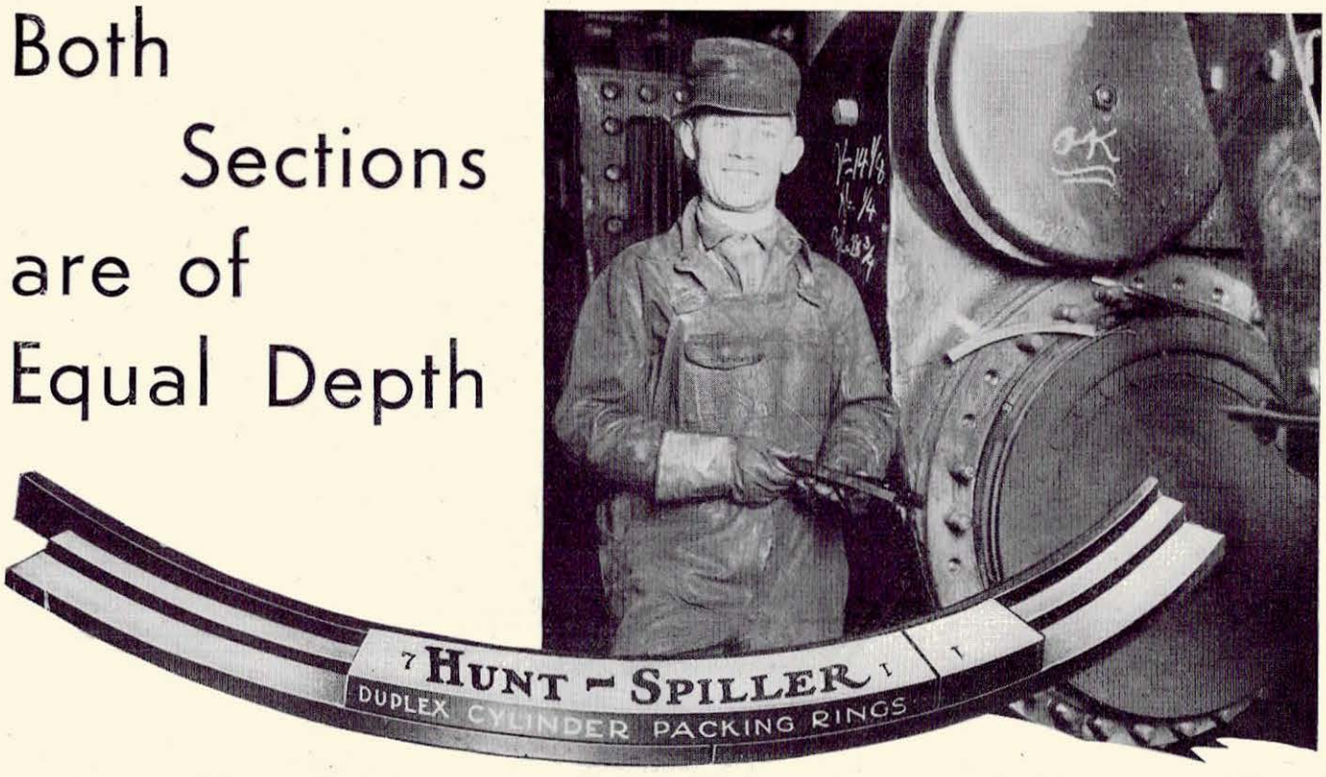
Frank Nay, formerly vice-president and comptroller of the Chicago, Rock Island & Pacific, with headquarters at Chicago, died at Phoenix, Ariz., on January 6. Mr. Nay was born near Columbus, Ohio, on April 19, 1861, and after graduating from high school at Greenville, Ill., in 1878, taught school for the following five years. He entered railway service in 1883 as a statistical clerk in the office of the general auditor of the Missouri Pacific at St. Louis, Mo. Later he served successively as a clerk on statistics and freight accounts in the accounting department of the Texas & St. Louis (now part of the St. Louis Southwestern), and as traveling auditor and chief clerk in the office of the general auditor of that road. In 1899 he became auditor of the Minneapolis & St. Louis, then being appointed assistant comptroller of the Rock Island in 1903. In the following year he was appointed general auditor, becoming comptroller of the Rock Island in 1909. Mr. Nay was elected vice-president and comptroller in May, 1918, leaving railway service in January, 1921, to become comptroller of the Allied Chemical & Dye Corporation at New York, a position he retained until 1926.

* * * *



On the Romsdal Valley Line of the Norwegian State Railways

Both Sections are of Equal Depth



THIS is one of the features in the design of HUNT-SPILLER *Duplex Sectional Packing* which is responsible for its outstanding performance on all types of modern power.

The two sections being of equal depth insure maximum wear without breakage. The spring which supports the section will not collapse because it is scientifically formed and heat treated to withstand high cylinder temperatures.

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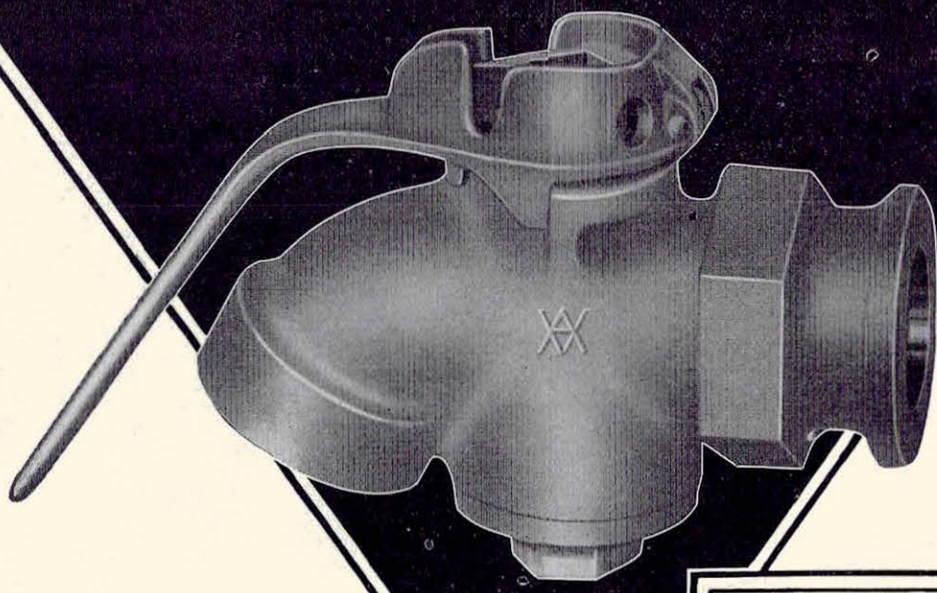
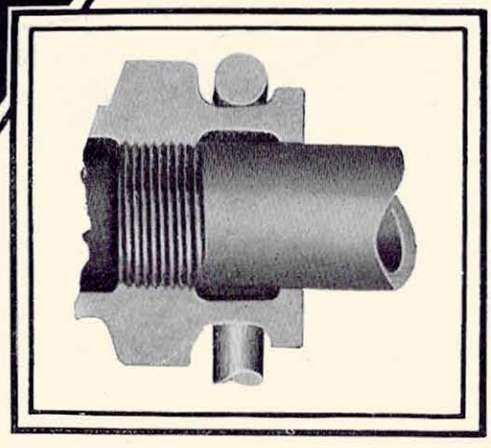


Less Leakage Loss



The U bolt extension is bored to form a close fitting support around the nipple . . . thus relieving the threaded portion of bending strains.

OUR improved Angle Cock with U bolt extension may be so firmly attached to a supporting bracket that it cannot turn nor shift its position . . . thus removing the cause of a succession of losses . . . loss of brake pipe air . . . loss of brake effectiveness and integrity . . . loss of money due to wasted air and excessive maintenance. ▼ ▼

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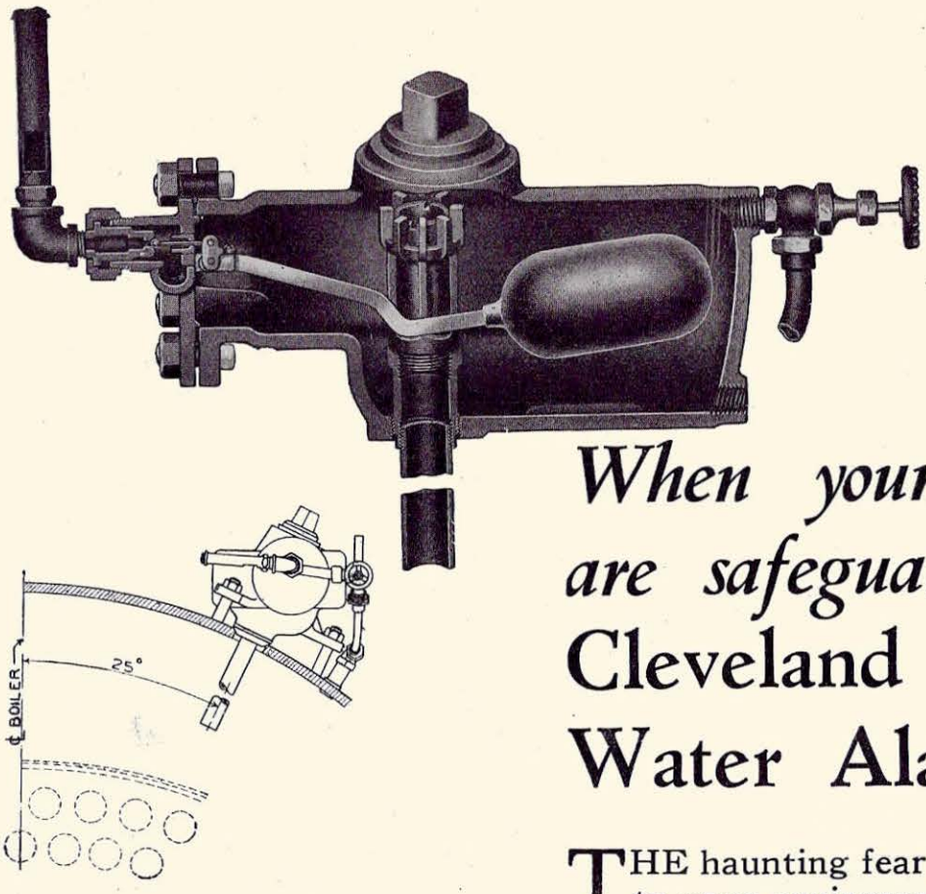

When your locomotives are safeguarded by the Cleveland Float Low Water Alarm

THE haunting fear of dangerous accidents to your equipment loses its terrors.

ADVANTAGES:

1. Operated only by the height of the water above the crown sheet.
2. May be tested thoroughly, any time or anywhere quickly and easily without subsequent adjustments.
3. The testing of this alarm exactly duplicates the functioning of the alarm under low water conditions.
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Meeting the Demands of WINTER

The severe storms of winter tax the capacity of your locomotives more than at any other season of the year. Cold journals, heavy head winds, more steam to heat the train — a combination that calls for maximum capacity.

The application of Elesco feed water heaters will increase locomotive boiler capacity approximately 15 per cent through utilization of the heat in the exhaust steam—heat otherwise wasted.

This is a simple, effective way of increasing the sustained boiler capacity of your existing locomotives.

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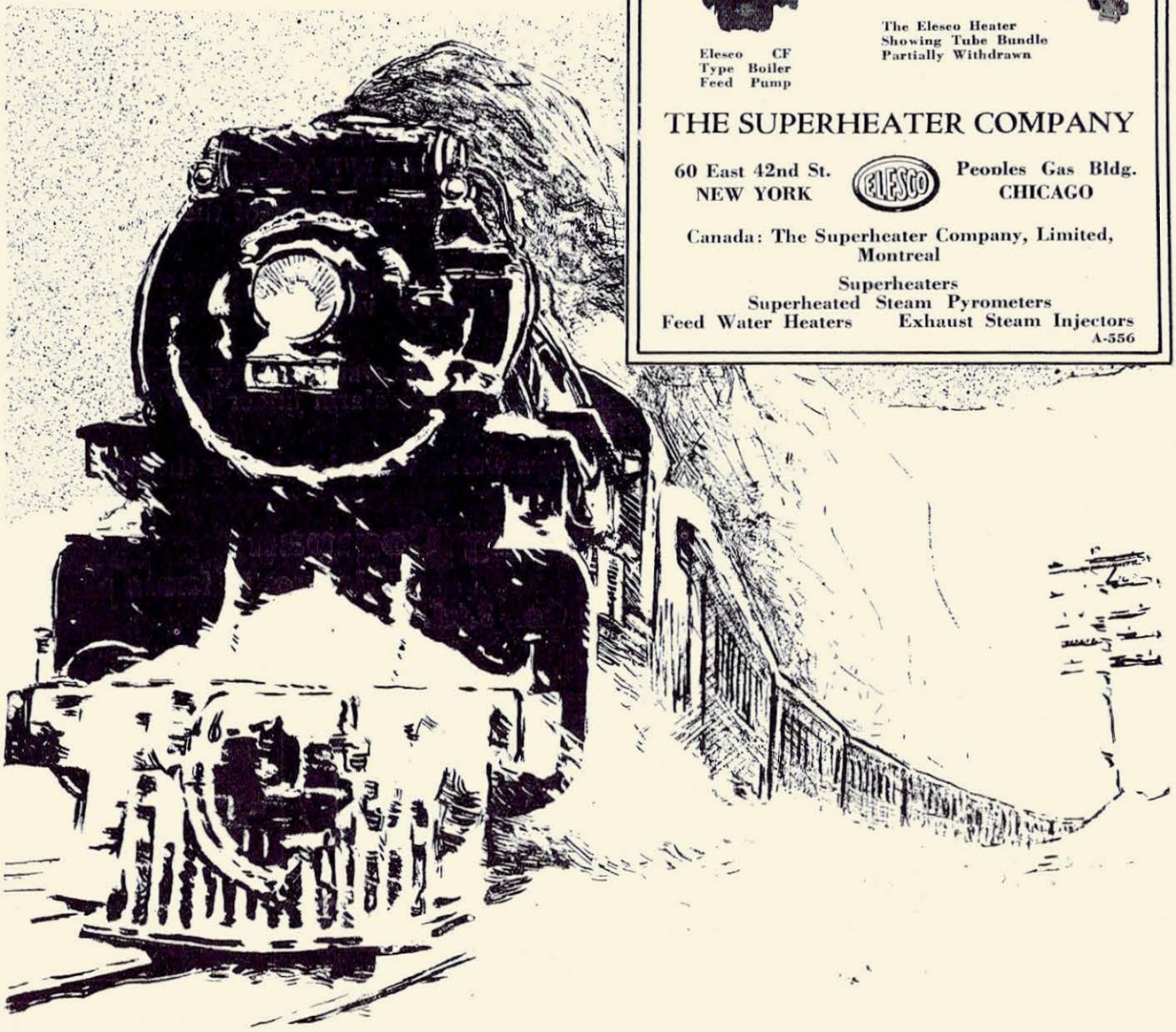
The Elesco Heater Showing Tube Bundle Partially Withdrawn



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LONG AFTER less hardy metals have been scrapped you'll find chain made of Reading OLD HICKORY Chain Iron still staunch . . . still serviceable . . . in at the finish!

OLD HICKORY Chain Iron is fibrous in structure . . . built like a stick of seasoned hickory to absorb shock and strain. Naturally resistant to corrosion, this iron defies the effects of salt water, salt air and smoke for longer years.

Reading manufactures chain iron in all grades . . . Lloyd's Test, Double Refined Crane, and Special Dredge. For certainty of dependable performance, be sure you get Reading.

Nick-bend test of Reading OLD HICKORY Bar Iron . . . Note the fibrous structure

OLD HICKORY *Rivet Iron*

For hull work below the water line, and wherever metal must stand exposure to alternating wet and dry conditions, you'll appreciate the greater endurance of Reading OLD HICKORY Rivet Iron. Write us for information.

Reading Bar Iron is furnished in the following sizes: Rounds ½" to 4½" in diameter. Squares ½" to 4". Flats 1" x ¼" to 10" x 2". Half rounds ⅞" to 1½". Hexagons ⅝" to 1¾" inclusive.

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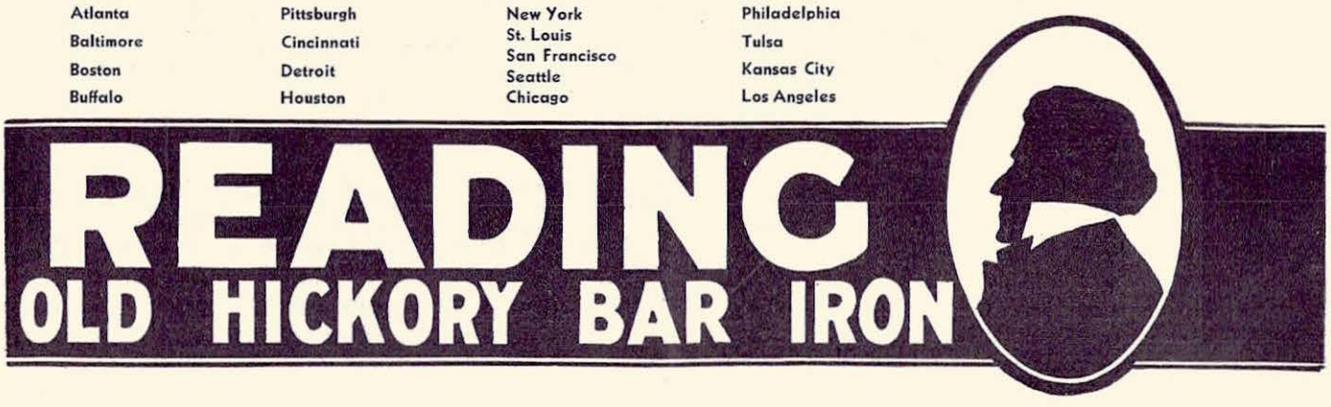
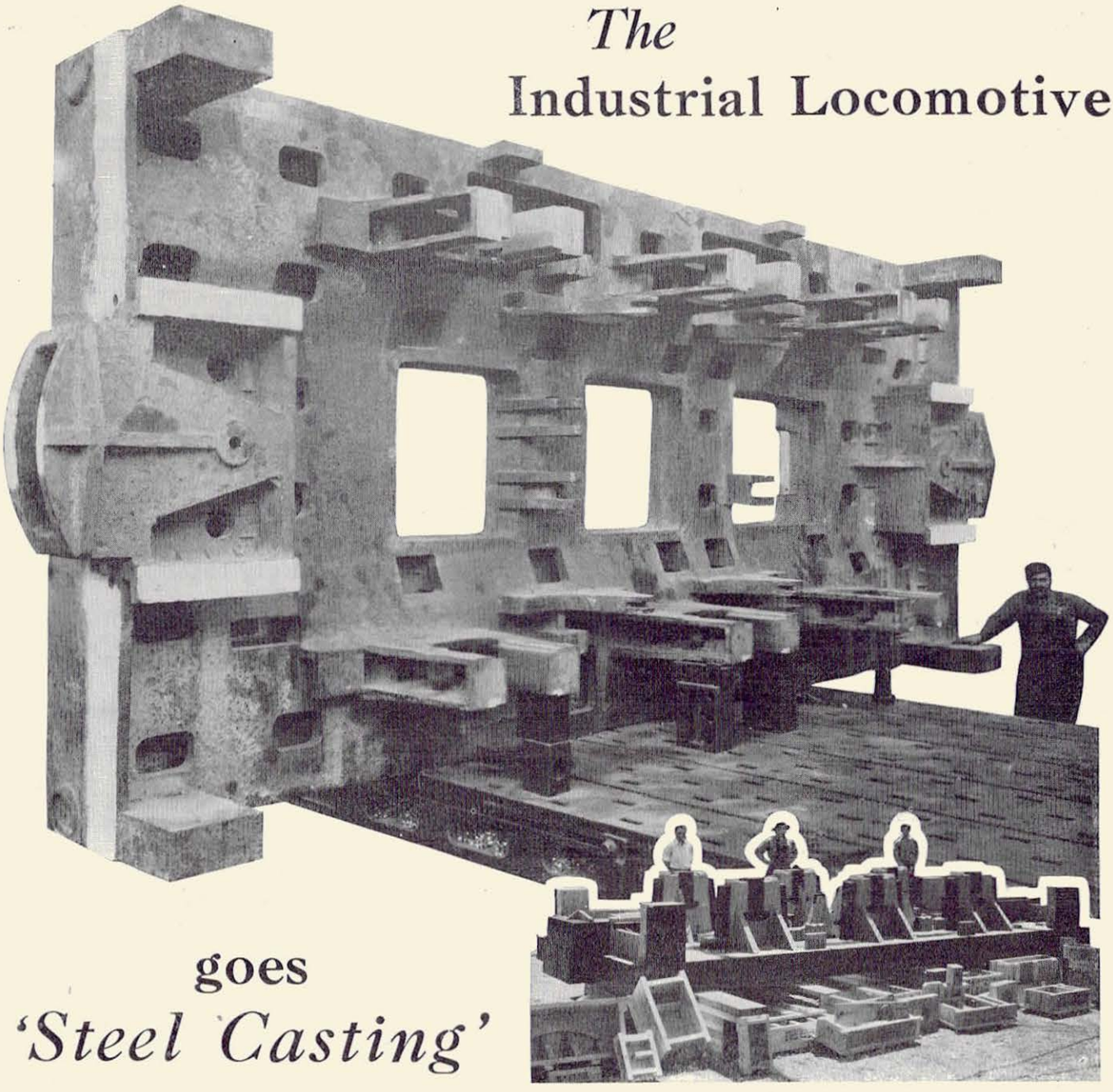


The Industrial Locomotive



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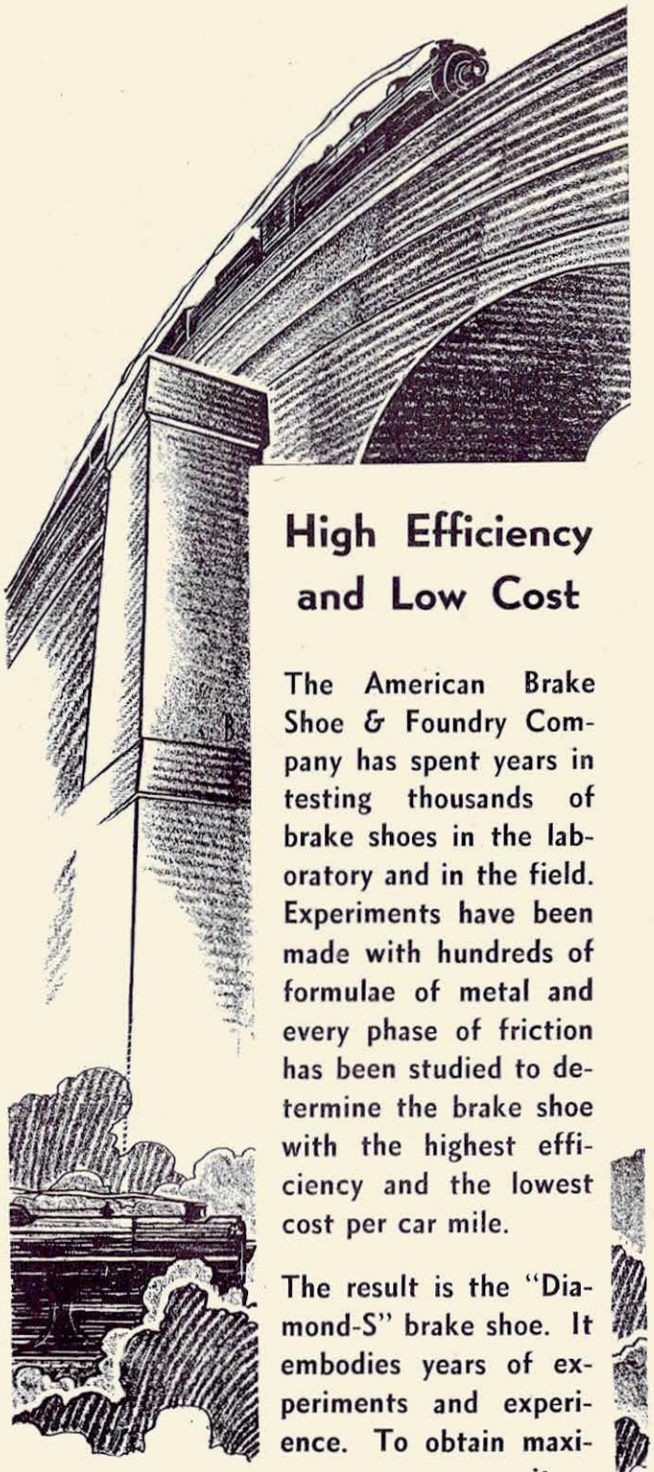

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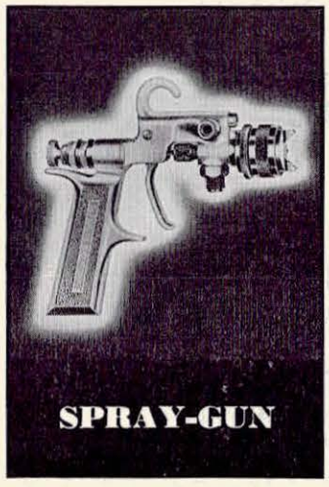

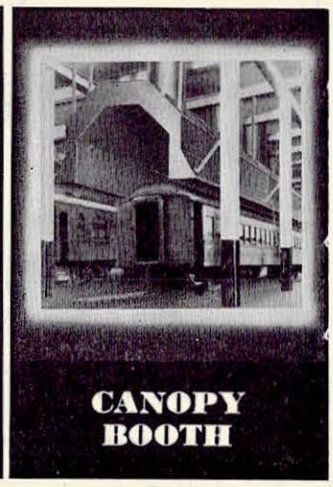

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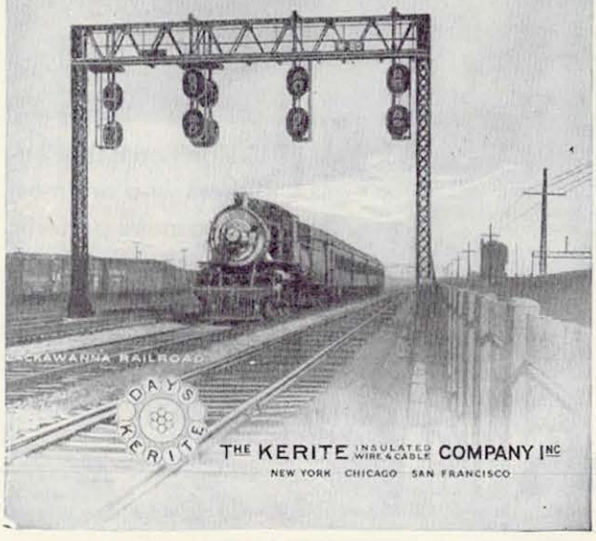

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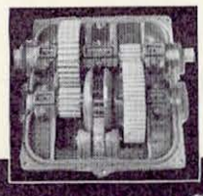

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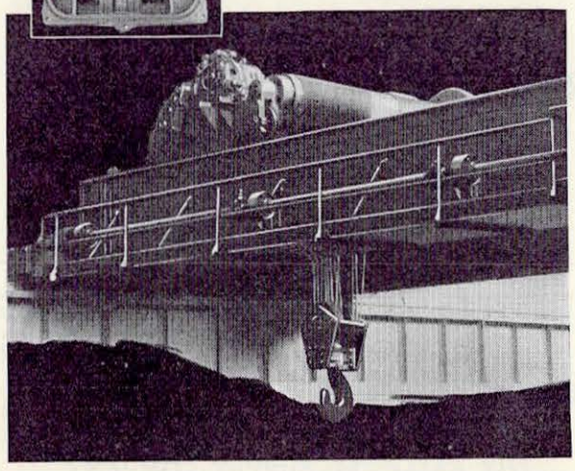
WRITE FOR BULLETINS No. 100 AND 101



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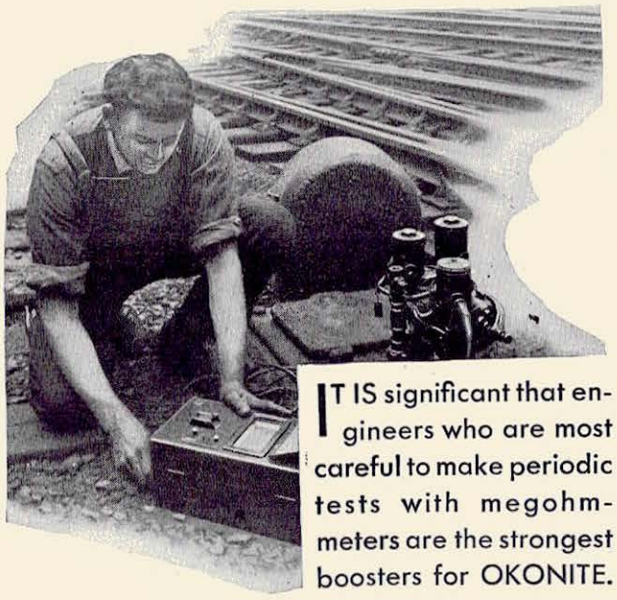

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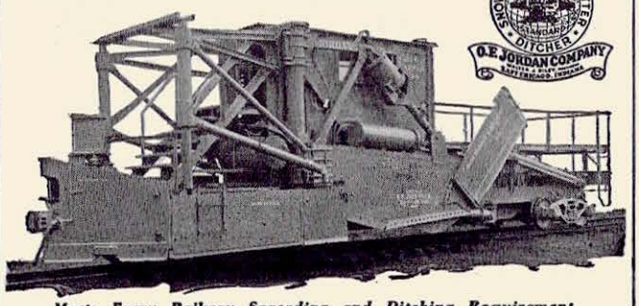

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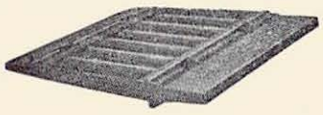

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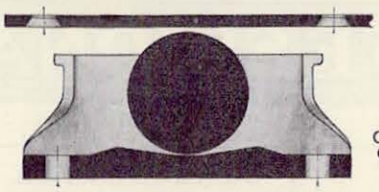

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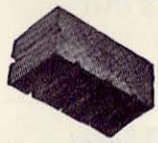

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Bethlehem Steel Co.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach Co.
Buckeye Steel Castings Co.
General Steel Castings Corp.
Gould Coupler Co., The
McConway & Torley Co.
Midvale Co., The.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Steel Casting Co.
Universal Draft Gear Attachment Co.

Castings, Steel Loco.
Birdsboro Steel Foundry & Mach. Co.
General Steel Castings Corp.
Gould Coupler Co., The
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Castings, Steel Vanadium.
Birdsboro Steel Foundry & Mach Co.
Brill Co., The J. G.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Catchbasins, Corrugated Iron.
Armco Culvert Mfrs. Assoc.

Cellers, Engine Truck.
Ardco Mfg. Co.

Cement Car, Asphalt.
Lehon Co., The
Sherwin-Williams Co.

Cement, High Temperature.
Carey Co., Philip, The.
Johns-Manville Corp.

Cements, Asbestos and Magnesia.
Carey Co., Phillip, The.

Center Plates — (See Bearings, Center).

Center Sills.
Bettendorf Co., The.
Bradford Corporation.

Chain Monel Metal.
International Nickel Co. The.

Chemicals.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.

Chemicals, Boiler.
Bird-Archer Co., The.

Chemicals, Cleaning.
Oakite Products, Inc.

Chemists.
Bird-Archer Co., The
Dearborn Chemical Co.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Chromium.
Electro Metallurgical Sales Corp.

Chromium Plating.
Worthington Pump & Machinery Corp.

Chucks, Lathe.
Ryerson & Son, Jos. T.

Cinder Handling Plants.
Roberts & Schaefer Co.

Circuit Breakers.
General Electric Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Clamps, Flanging.
Ryerson & Sons, Jos. T.

Clamps, Guard Rail.
O. & C. Co., The.
Westinghouse Air Brake Co.

Clamps, Hose.
Ingersoll-Rand Co.
National Malleable & Steel Castings Co.
Vapor Car Heating & Lighting Co.
Westinghouse Air Brake Co.

Clamps, Pipe.
Franklin Railway Supply Co., Inc.
National Malleable & Steel Castings Co.

Clamps, Rail Cutting.
Oxweld Railroad Service Co., The.

Classification Yard Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Cleaners, Aircraft.
Oakite Products, Inc.

Cleaners, Air Pump.
Oakite Products, Inc.
Westinghouse Air Brake Co.

Cleaners, Bus & Truck.
Oakite Products, Inc.

Cleaners, Car.
Oakite Products, Inc.

Cleaners, Flue.
Ryerson & Son, Jos. T.

Cleaners, General.
Oakite Products, Inc.

Cleaners, Locomotive.
Oakite Products, Inc.

Cleaners, Metal.
Oakite Products, Inc.

Clips, Wire Rope.
American Hoist & Derrick Co.

Coach and Coach Yard Steam Joints—(See Joints, etc.)

Coaches, Motor.
American Car & Foundry Motors Co.
Dodge Motor Truck Corp.
International Harvester Co.
White Co., The.

Coaches, Second-Hand.
Hyman-Michaels Co.

Coal, Ore & Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.
Roberts & Schaefer Co.

Coal Pushers.
Standard Stoker Co.

Coaling Stations.
American Bridge Co.
Fairbanks-Morse & Co.
Roberts & Schaefer Co.

Cocks, Angle.
Westinghouse Air Brake Co.

Cocks, Blow-Off.
Bird-Archer Co., The.

Cocks, Cylinder.
Prime Manufacturing Co., The.

Columns, Water.
Prime Manufacturing Co., The.

Combination Crane Pile Drivers.
Industrial Brownhoist Corp.

Compounds, Boiler.
Dearborn Chemical Co.
Bird-Archer Co., The
General Electric Co.

Compounds, Cleaning.
Oakite Products, Inc.

Compounds, Cutting.
Oakite Products, Inc.

Compounds, Grinding.
Oakite Products, Inc.

Compounds, Paint Removing.
Oakite Products, Inc.

Compounds, Rust Proofing.
Oakite Products, Inc.

Compressors, Air.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Concrete Floor Slabs.
Federal American Cement Tile Co.

Concrete Reinforcement.
American Steel & Wire Co.
Carnegie Steel Co.
Ryerson & Sons, Jos. T.

Concrete Roofing, Tile.
Federal American Cement Tile Co.

Condensers.
Ingersoll-Rand Co.

Condensing Apparatus.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Conduit, Rigid.
Aluminum Co. of America.

Conduits, Metallic Flexible.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Graybar Electric Co.
Vapor Car Heating Co., Inc.

Conduit, Underground.
Graybar Electric Co.
Johns-Manville Corp.

Connections.
Prime Manufacturing Co., The.

Connections, Lever.
National Malleable & Steel Castings Co.

Connections, Truck.
National Malleable & Steel Castings Co.

Connections, Truck Lever.
Schaefer Equipment Co.

Contraction Joint.
General Railway Signal Co.

Control Devices, Train Speed.
Union Switch & Signal Co.

Control, Locomotive.
Valve Pilot Co.

Controllers, Electric.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Conveying Machinery.
American Bridge Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Corrugated Sheet.
Aluminum Co. of America.

Conveyor, Ash — (See Coal Ore and Ash Handling Mach.)

Coupler Pockets—(See Draft Yokes.)

Coupler Yokes.
Bettendorf Co., The.
Gould Coupler Co.
Symington Co., The.

Couplers.
American Steel Foundries.
Buckeye Steel Castings Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Westinghouse Air Brake Co.

Couplings, Hose.
Fort Pitt Malleable Iron Co.
Gold Car Htg. & Lighting Co
Ingersoll-Rand Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co

Cranes, Ballast Cleaning.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Barge.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Bracket.
Shephard-Niles Crane & Hoist Corp.

Cranes, Crawler.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Crawling Shovels and Draglines.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton, Crane & Shovel Co.

Cranes, Diesel.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Electric Traveling.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Gantry.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.
Shephard-Niles Crane & Hoist Corp.

Cranes, Gasoline.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes, Grab Bucket.
American Hoist & Derrick Co.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Handpower.
American Hoist & Derrick Co.
Shephard-Niles Crane & Hoist Corp.

Cranes, Jib.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Worthington Pump & Machinery Corp.

Cranes, Locomotive.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes, Overhead.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Pillar.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Portable.
American Hoist & Derrick Co.

Orton Crane & Shovel Co.

Cranes, Tractor.
Orton Crane & Shovel Co.

Cranes, Transfer.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Traveling.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Wharf.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Wrecking.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Crank Pins — (See Pins, Cranks).

Creosote.
American Creosoting Co.
Century Wood Preserving Co.
International Creosoting & Constr. Co.
Jennison Wright Co.

Cribbing Units.
Federal American Cement Tile Co.

Cross Arms.
American Bridge Co.
General Electric Supply Corp.
Graybar Electric Co.
International Creosoting & Construction Co.

Cross Ties.
Century Wood Preserving Co.
International Creosoting & Construction Co.

Cross Ties, Creosoted.
American Creosoting Co.
Century Wood Preserving Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Cross Ties, Steel.
Bethlehem Steel Co.

Crossheads & Shoes.
Baldwin Locomotive Wks.
Barco Mfg. Co.
International Creosoting & Construction Co.

Crossing Signals & Signs.
Railroad Supply Co.

Crossings — (See Frogs and Crossings).

Crossings, Pavement.
Carey Co., The Philip

Crushers, Coal.
American Sheet & Tin Plate Co.
Orton Crane & Shovel Co.

Culverts.
Armco Railroad Sales Co.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
Toncan Culvert Manufacturers' Association.

Culverts Corrugated.
Armco Culvert Manufacturers' Association.
Republic Steel Corp.

Culverts, Paved Invert.
Armco Culvert Mfrs. Assoc.

Cupolas, Foundry.
Hammett, H. G.

Cups, Oil.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co.

Curtains, Cab
Lehon Co., The

Curtains & Fixtures, Car Window.
Pantasote Co., Inc., The.

Curtain Material, Car.
Ryerson & Son, Jos. T.

Cutting & Welding Apparatus.
Oxweld Railroad Service Co.
Westinghouse Elec. & Mfg. Co.

Cut-Off Indicators & Recorders.
National Tube Co.
Valve Pilot Co.

Cylinder Parts (Finished & Rough).

Cylinders, Air Brake.
Westinghouse Air Brake Co.

Cylinders, Cast Steel Locomotive.
General Steel Castings Corp.
Union Steel Casting Co.

Cylinders, Oxy-Acetylene.
Oxweld Railroad Co., The

Deoxidizers.
Q & C Co., The.
Vanadium Corp. of America.

Derricks.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.

Diesel Electric Power Plants
Fairbanks-Morse & Co.
Westinghouse Elec. & Mfg. Co.

Dirt Collectors.
Westinghouse Air Brake Co.

Disinfectants.
West Disinfecting Co.

Dispatching Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Ditchers.
American Hoist & Derrick Co.
Jordan Co., O. F.

Ditching Machinery.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Door Fixtures—(See Fixtures Car Door).

Doors, Car.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
Wine Railway Appliance Co.

Doors, Folding, Rolling and Sliding.
Kinnear Manufacturing Co.

Doors, Locomotive Firebox.
Franklin Railway Supply Co., Inc.

Doors, Steel.
Kinnear Manufacturing Co.

Doors, Rolling, Steel.
Kinnear Mfg. Co.

Doors, Wood.
Kinnear Mfg. Co.

Draft Arms.
American Steel Foundries.
Birdsboro Steel Foundry & Mach. Co.
Bradford Corporation.
Symington Co., The.
Universal Draft Gear Attachment Co.

Draft Gear Attachments.
Symington Co., The.

Draft Gears.
American Steel Foundries.
Bradford Corporation.
Cardwell-Westinghouse Co.
Edgewater Steel Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Union Draft Gear Co.
Universal Draft Gear Attachment Co.

Draft, Yokes
American Steel Foundries.
Bettendorf Co., The.
Buckeye Steel Castings Co.
Gould Coupler Co., The
McConway & Torley Co.
Miner, W. H.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Co.
Symington Co., The
Universal Draft Gear Attachment Corp.

Draglines.
Orton Crane & Shovel Co.

Drainage Gates.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Drains, Perforated Iron.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Drawbar Centering Device.
Gould Coupler Co., The
Miner, W. H.

Drawbars, Unit Safety.
Franklin Railway Supply Co., Inc.
Industrial Brownhoist Corp.

Dredging Machinery.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.

Drilling Machines.
Sellers & Co., Inc., Wm.

Drilling Machines, Bonding.
Railroad Supply Co.

Drilling Machines, Pneumatic.
Ingersoll-Rand Co.

Drilling Machines, Rock.
General Electric Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drilling Machines, Upright and Radial.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Drills.
Ingersoll-Rand Co.

Drills, Close Corner.
Ingersoll-Rand Co.

Drills, Concrete.
Ingersoll-Rand Co.

Drills, Steel Rock and Steel Sharpened.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Track & Bending.
Bird-Archer Co., The.
Ingersoll-Rand Co.

Drinking Cups.
U. S. Envelope Co.

Drive Gas Electric Coaches.
General Electric Co.

Drive Gas Electric Locomotives
Westinghouse Elec. & Mfg. Co.

Driving Boxes (Extended Main).
Franklin Railway Supply Co., Inc.

Drop Door Mechanism.
Wine Railway Appliance Co.

Dynamos — (See Generators Electric).

Electrical Cable Accessories.
General Cable Corp.
General Electric Supply Corp.

Electric Cables.
Anaconda Wire & Cable Co.
General Cable Corp.
General Electric Supply Corp.

Electrical Instruments.
Electric Service Supplies. Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Electrical Supplies.
General Electric Co.
General Electric Supply Corp.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Electrification, Railroad.
Battey & Kipp.
General Electric Co.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Electric Heaters.
General Electric Supply Corp.

Electrical Insulation.
General Cable Corp.
General Electric Supply Corp.

Electrical Porcelain Insulators.
General Electric Supply Corp.

Electric Motors.
General Electric Supply Corp.

Electric Rivet Heaters.
General Electric Supply Corp.

Electric Switches.
General Electric Supply Corp.

Enamels.
du Pont de Nemours & Co., Inc., E. I.
Sherwin-Williams Co.

End Frames, Cast Steel, Passenger Car
General Steel Castings Corp.

Ends, Steel.
Hutchins Car Rfg. Co.
Union Metal Products Co.

Engineers, Consulting, Civil, Elec., Hydraulic, Mechanical.
Battey & Kipp.
Hunt Co., Robt. W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Contracting.
Battey & Kipp.
United Engineers & Constructors, Inc.

Engineers and Contractors.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Construction.
Battey & Kipp.
Roberts & Schaefer Co.
United Engineers & Constructors, Inc.

Engineers and Contractors, Elec. Hydraulic, Mech.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
Roberts & Schaefer Co.

Engineers, Inspecting.
Gulick-Henderson Co.
Hunt Co., Robert W.
Muhlfeld, John E.
Pittsburgh Testing Laboratory.
United Engineers & Constructors, Inc.

Engineers, Valuation.
Hunt Co., Robert W.
United Engineers & Constructors, Inc.

Engines, Crude & Fuel Oil.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Diesel.
Worthington Pump & Machinery Corp.

Engines, Gas.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Engines, Gas & Gasoline.
American Car & Foundry Motors Co.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Hoisting.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Envelopes.
U. S. Envelope Co.

Excavators.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.

Exhaust & Heater Pipe.
Union Asbestos & Rubber Co.

Exhaust & Ventilating Fans.
General Electric Supply Corp.

Expanders, Tube.
Ryerson & Son, Joseph T.

Explosives.
American Steel & Wire Co.
du Pont de Nemours & Co., Inc., E. I.

Fans, Exhaust & Ventilating.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Fasteners, Car Door.
Camel Sales Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Feed Water Heater Systems.
Bird-Archer Co., The.
Coffin, Jr., Co., The J. S.
Worthington Pump & Machinery Corp.

Fence Posts.
International Creosoting & Construction Co.

Fencing Wire — (See Wire Fence).

Fence Posts, Creosoted.
National Lumber & Creosoting Co.

Ferro Alloys.
Vanadium Corp. of America.

Ferro, Chromium.
Vanadium Corp. of America.

Ferro Molybdenum.
Electro Metallurgical Sales Corp.
Vanadium Corp. of America

Ferro Silicon.
Vanadium Corp. of America.

Ferro Tungsten.
Vanadium Corp. of America.

Ferro Vanadium.
Vanadium Corp. of America.

Filters, Air.
Westinghouse Air Brake Co.

Filters, Dust.
Whiting Corporation.

Filters, Water & Industrial.
Graver Tank & Mfg. Corp.

Filtration Plants, (Water).
Graver Tank & Mfg. Corp.

Fireboxes.
American Locomotive Co.
Baldwin Locomotive Works

Fire Fighting & Protection Equipment.
Johns-Manville Corp.

Fittings, Air Brakes.
Westinghouse Air Brake Co.

Fittings, Steam.
Vapor Car Heating Co., Inc.

Fixtures, Car Door.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Flangers, Snow.
Q & C Co., The.

Floodlights.
General Electric Supply Corp.
Graybar Electric Co.
Oxweld Railroad Service Co.
Pyle-National Co.
Symington Co., The.
Westinghouse Elec. & Mfg. Co.

Floodlights, Acetylene.
Oxweld Railroad Service Co., The.

Flooring.
Carey & Co., Philip, The.
Jennison-Wright Co.
Johns-Manville Corp.

Flooring, Car.
Tuco Products Corp.

Flooring, Coach.
Tuco Products Corp.

Flooring, Composition.
Johns-Manville Corp.
Tuco Products Corp.

Flooring, Creosoted.
Central Coal & Coke Co.

Flooring, Wood.
Central Coal & Coke Co.
Century Wood Preserving Co.

Floor Plates, Steel.
Carnegie Steel Co.
Illinois Steel Co.

Floor Slabs, Concrete.
American Cement Tile Mfg. Co.

Flue Cleaners—(See Cleaners, Flue).

Flue Cutters—(See Cutters, Flue).

Flues, Boiler — (See Tubes Boiler).

Flue Shop Equipment.
Ryerson & Son, Joseph T.

Forges, Rivet Heating.
Ryerson & Son, Joseph T.

Forging Hammers.
Industrial Brownhoist Corp.

Forgings.
American Bridge Co.
American Steel Foundries.
Bethlehem Steel Company.

Brill Co., The J. G.
Carnegie Steel Co.
Edgewater Steel Co.
General Railway Signal Co.
Gould Coupler Co., The
Illinois Steel Co.
Midvale Co., The.
Mt. Vernon Car Mfg. Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.

Forgings, Drop.
Brill Co., The J. G.
General Railway Signal Co.
Steel Car Forge Co.
Union Switch & Signal Co.

Forgings, Monel Metal.
International Nickel Co., The.

Foundry Supplies.
Bird-Archer Co., The

Frames, Cast Steel, Locomotive
General Steel Castings Corp.

Frames, Locomotive.
American Steel Foundries.
American Locomotive Co.
Baldwin Locomotive Works
Birdsboro Steel Foundry & Mach. Co.
Ohio Steel Foundry Co., The.
Union Steel Casting Co.

Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Buckeye Steel Castings Co.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Pressed Steel Car Co.
Pyle-National Co.
Symington Co., The

Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Works
Birdsboro Steel Foundry & Mach. Co.
Union Steel Casting Co.

Frogs and Crossings.
Bethlehem Steel Company.
Continuous Rail Crossing Corp.
Ramapo Ajax Corp.

Fulcrums, Brake Beam.
American Steel Foundries.
Brill Co., The J. G.
Chicago Railway Equipment Co.
National Malleable & Steel Castings Co.

Furnaces, Electric.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Furnaces, Gasoline.
Railroad Supply Co.
Whiting Corporation.

Furnaces, Rivet Heating — (See Forges, Rivet Heating).

Furniture.
Aluminum Co. of America.

Gage Testers—(See Testers Gage).

Gages, Air.
Westinghouse Air Brake Co.

Gages, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Gages, Steam.
Ashton Valve Co.

Gages, Wheel Press Recording.
Ashton Valve Co.

Gaskets.
Westinghouse Air Brake Co.

Gasoline.
Ethyl Gasoline Corp.

Gear Blanks, Rolled Steel.
Edgewater Steel Co.
Standard Steel Works Co.

Gears and Pinions.
American Steel Foundries.
Westinghouse Elec. & Mfg. Co.

Gears, Silent.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gears, Valve — (See Valve Gears).

Generators, Acetylene.
Oxweld Railroad Service Co.

Generators, Car Lighting.
Safety Car Heating & Lighting Co.

Generators, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Sunbeam Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Goggles, Welding.
Oxweld Railroad Service Co., The.
Sunbeam Electric Mfg. Co.

Graders, Elevating.
Western Wheeled Scraper Co.

Graphite Penetrating Oil.
Alemite Mfg. Corp.

Grapples, Wood.
Industrial Brownhoist Corp.

Grate Bars.
Q & C Co., The.

Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.

Grates.
Firebar Corp.

Greases.
Alemite Mfg. Corp.

Grease Forming Machines.
Franklin Railway Supply Co., Inc.

Grey Iron.
American Brake Shoe & Foundry Co.

Grinding Machines.
Sellers & Co., Inc., Wm.

Grinding Machines, Portable.
Ingersoll-Rand Co.

Guard Rails, Creosoted Wood
International Creosoting & Construction Co.

Guard Rails, Foot Guard.
Q & C Co., The.

Guard Rails (One Piece).
Bethlehem Steel Company.
Ramapo Ajax Corp.

Guard Switch Point.
Q & C Co., The.

Guards, Cattle.
American Bridge Co.

Guards, Dust.
Gould Coupler Co., The
Symington Co., The.

Hair Felt.
Johns-Manville Corp.

Hammers, Pneumatic.
Ingersoll-Rand Co.

Hammers, Riveting.
Ingersoll-Rand Co.

Hammers, Steam.
Industrial Brownhoist Corp.
Sellers & Co., Inc., Wm.

Hand Brakes—(See Brakes, Hand).

Hangers, Ball Bearing.
S. K. F. Industries, Inc.

Hand Rails & Fittings.
Aluminum Co. of America.

Hangers, Bottom Rod Safety.
Chicago Railway Equipment Co.

Hangers, Car Door — (See Fixtures, Car Door).

Headlight Repair Parts, Electric.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlights, Electric.
General Electric Co.
Sunbeam Electric Mfg. Co.
Westinghouse Electric & Mfg. Co.

Headlights, Reflectors & Cases.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Heaters, Electric.
Gold Car Htg. & Ltg. Co.
Westinghouse Electric & Mfg. Co.

Heaters, Electric Rivet.
American Hoist & Derrick Co.

Heaters, Feedwater.
Graver Tank & Mfg. Corp.

Heaters, Feedwater Locomotive.
Coffin Co., Jr., The J. S.
Superheater Company, The.
Worthington Pump & Machinery Corp.

Heaters, Feed Water, Stationary.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Heating & Ventilating Apparatus.
Vapor Car Heating Co., Inc.
Westinghouse, Electric & Mfg. Co.

Heating Equipment, Car.
Gold Car Htg. & Ltg. Co.
Safety Car Htg. & Ltg. Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Heating Systems, Car (Electric and Steam).
Gold Car Htg. & Ltg. Co.
Safety Car Htg. & Ltg. Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

High Temperature Cements.
Carey & Co., Philip, The.

Highway Crossing Protection Devices.
American Bridge Co.
Franklin Railway Supply Co., Inc.
Railroad Supply Co.

Hoists, Chain.
Milwaukee Electric Crane & Hoist Corp.
Ryerson & Son, Jos. T.

Hoists, Electric.
American Hoist & Derrick Co.
Milwaukee Electric Crane & Hoist Corp.

Hoists, Pneumatic.
Ingersoll-Rand Co.

Hoists, Second-Hand.
Hyman-Michaels Co.

Hoisting Machinery.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.
Milwaukee Electric Crane & Hoist Corp.

Hooks, Wrecking.
National Malleable & Steel Castings Co.

Horns, Pneuphonic.
Westinghouse Air Brake Co.

Hose, Air, Steam, Etc.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Hose, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Hose, Tender.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co.

Ice Cutters.
Jordan Co., O. F.

Incandescent Lamps.
General Electric Supply Corp.

Indicators, Speed & Cut-off.
Valve Pilot Co.

Ingots.
Birdsboro Steel Foundry & Mach. Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
Interstate Iron & Steel Co.
McConway & Torley Co.
Standard Steel Works Co.

Injectors, Exhaust Steam.
Sellers & Co., Inc., Wm.
Superheater Co., The.

Inspection of Material and Equipment—(See Engineers, Inspection).

Insulated Wire.
Anaconda Wire & Cable Co.
General Cable Corp.
General Electric Supply Corp

Insulation, Car.
Carey Co., Philip, The.
Lehon Co., The.

Insulation, Car Bldg.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co

Insulation, Electrical.
General Cable Corp.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulation, Exhaust & Heater Pipe.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co.

Insulation, Heat
Carey Co., Philip, The.
Miner, W. H.

Insulation Tape.
General Electric Supply Corp.

Insulators, Electrical, Porcelain.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Interlocking Plant Equipment.
General Railway Signal Co.
Union Switch & Signal Co.

Iron Chain.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.

Iron, Charcoal.
Bethlehem Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.

Iron, Engine Bolt.
Lockhart Iron & Steel Co.

Iron, Forging Billets.
Lockhart Iron & Steel Co.

Iron, Hollow Staybolt.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Hollow Staybolt Bars.
Bethlehem Steel Co.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Pig.
Bethlehem Steel Co.

Iron, Refined.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Iron, Staybolt — (See also Staybolts).
Ewald Iron Co.
Falls Hollow Staybolt Co.
Interstate Iron & Steel Co.
Lockhart Iron & Steel Co
Reading Iron Co.
Ryerson & Son, Jos. T.

Jacking, Locomotive
Carey Co., Philip, The.

Jacks, Smoke.
Carey Co., Philip, The.
Johns-Manville Corp.

Joints, Air Reservoir.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Blow Off Line (Roundhouse).
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Coach and Coach Yard.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Flexible.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Flexible Ball.
Barco Mfg. Co.

Joints, Rail.
American Steel Foundries.
Carnegie Steel Co.
Illinois Steel Co.
Q & C Co., The.
Rail Joint Co.
Union Switch & Signal Co.

Joints, Steam, Air & Liquid.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Swing.
Barco Mfg. Co.
Vapor Car Heating Co., Inc.

Journal Boxes and Lids.
Allegheny Steel Co.
American Steel Foundries.
Brill Co., The J. G.
Gould Coupler Co., The.
Hunt-Spiller Mfg. Corp.
National Malleable & Steel Castings Co.
Pullman Car & Mfg. Corp.
Railway Steel Spring Co.
Symington Co., The.
Union Spring & Mfg. Co.

Journal Oilers, Car & Locomotive.
Ardco Mfg. Co.

Keys, Brake Shoe.
Bradford Corporation.
Mt. Vernon Car Mfg. Co.
Steel Car Forge Co.
Union Spring & Mfg. Co.

Knuckles Emergency.
Q & C Co., The.

Laboratories, Testing.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Lacquers.
General Electric Supply Corp.
Sherwin-Williams Co.

Ladders, Steel Car.
Wine Railway Appliance Co.

Lagging, Locomotive.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lamps, Incandescent.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Inspector's.
Oxweld Railroad Service Co., The.

Lath, Metal.
Armco Railroad Sales Co.
Truscon Steel Co.

Lathes, Axle.
Sellers & Co., Inc., Wm.

Lathes, Engine.
Ryerson & Son, Joseph T.

Lathes, Wheel.
Sellers & Co., Inc., Wm.

Lead, White.
National Lead Co.

Lighting Equipment, Car.
Electric Storage Battery Co.
Safety Car Htg. & Ltg. Co.

Lighting Fixtures and Systems.
General Electric Supply Corp.
Graybar Electric Co.
Pyle-National Co.
Safety Car Htg. & Ltg. Co.

Lighting Plants, Gas, Electric
Sunbeam Electric Mfg. Co.

Lightning Arresters.
General Electric Supply Corp.

Line Material.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lock Nuts—(See Nut Locks).

Locomotive Water Conditioners.
Bird-Archer Co., The.

Locomotives, Contractors.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Electric.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Locomotives, Gasoline.
Baldwin Locomotive Works.

Locomotives, Gas-Electric.
Electro Motive Co.

Locomotives, Geared.
Lima Locomotive Works.

Locomotives, Industrial.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Mine.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Oil Engine, Electric Driven.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Whitcomb & Co., Geo. D.

Locomotives, Rebuilt.
American Locomotive Co.

Locomotives, Repair Parts.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Second-Hand.
Hyman-Michaels Co.

Locomotives, Steam.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotive Stokers.
Standard Stoker Co.

Locomotive Valve Pilot.
Valve Pilot Co.

Lubricants.
Alemite Mfg. Corp.

Lubrication Equipment.
Alemite Mfg. Corp.

Lubrication Systems.
Alemite Mfg. Corp.

Lubricators, Driving Box.
Franklin Railway Supply Co., Inc.

Lubricators, Piston Rod.
Q & C Co., The.

Lumber.
Central Coal & Coke Co.
Curtin-Howe Corp.
West Coast Lumber Trade Extension Bureau.

Lumber, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lumber, Creosote Treated.
International Creosoting & Construction Co.

Lumber, Creosoted.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
Industrial Lumber & Creosoting Co.
International Creosoting & Construction Co.
Jennison-Wright Co.
National Lumber & Creosoting Co.

Machinery, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.

Machine Screws, Monel Metal
International Nickel Co., The.

Magnets, Lifting.
Industrial Brownhoist Corp.
Electro Metallurgical Sales Corp.

Mechanical Draft Apparatus—(See Heating and Vent. App.)

Mechanical Stokers.
Standard Stoker Co.

Melters, Snow, Electric.
Q & C Co., The.

Metallic Flexible Conduit.
General Electric Supply Corp.

Meters, Water & Oil.
Worthington Pump & Machinery Corp.

Milling Machines, Planer Type.
Sellers & Co., Inc., Wm.

Milling Machines, Plain and Universal.
Ryerson & Son, Joseph T.

Mohair Upholstery Velvets.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Molybdenum Metal.
Vanadium Corp. of America.

Monel Metal, Rods, Sheets, Tubes, Wire, etc.
International Nickel Co., The.

Motors, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Motors & Generators.
Fairbanks-Morse & Co.

Moulding.
Aluminum Co. of America.

Multiple V Belt Drives
Worthington Pump and chinery Corp.

Nails.
American Steel & Wire Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Nipples, Air Hose.
Prime Manufacturing Co.

Nozzles, Exhaust.
Franklin Railway Supply Co., Inc.

Nozzles, Oxy-Acetylene Cutting.
Oxweld Railroad Service Co., The.

Nuts—(See Bolts and Nuts).

Nut Locks.
Dardelet Threadlock Corp.
Grip Nut Co.
Reliance Mfg. Co.

Nuts, Tank Hose.
Prime Manufacturing Co., The.

Office Appliances.
Remington-Rand Business Service

Oil-Electric Locomotives.
American Locomotive Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Oil Filtering & Storage Systems.
Graver Tank & Mfg. Corp.

Oil, Linseed.
National Lead Co.

Oil Plugs, Steam Chest.
Franklin Railway Supply Co., Inc.

Oxy-Acetylene Apparatus.
Oxweld Railroad Service Co., The.

Oxygen.
Oxweld Railroad Service Co., The.

Packing, Air Pump.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.

Packing, Cylinder and Valve Ring.
Hunt-Spiller Mfg. Corp.
Westinghouse Air Brake Co.

Jacking, Locomotive.
Johns-Manville Corp.

Packing, Locomotive Cab Cock.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Ring Boiler.
Union Asbestos & Rubber Co.

Packing, Semi-Metallic.
Pilot Packing Co.
Central Alloy Steel Corp.

Packing, Sheet.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Soft.
Carey & Co., Philip, The.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.

Packing, Throttle.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing.
Westinghouse Air Brake Co.

Paint Burners, Acetylene.
Oxweld Railroad Service Co., The.

Paint, Metal Protective.
National Lead Co.
Sherwin-Williams Co.

Paint, Powder.
Aluminum Co. of America.

Paint Spraying Equipment
De Vilbiss Mfg. Co., The.

Paints.
du Pont de Nemours & Co., Inc., E. I.
National Lead Co.
Sherwin-Williams Co.

Paper, Carbon.
Remington-Rand Business Service

Paper, Sheathing.
Carey & Co., Philip, The.
Lehon Co., The.

Pavement Breakers.
Ingersoll-Rand Co.

Pickling Equipment, Monel Metal.
International Nickel Co., The.

Pile Drivers.
American Hoist & Derrick Co.
Industrial Brownhoist Co.

Piling, Creosoted.
American Creosoting Co.
Century Wood Preserving Co.
International Creosoting & Construction Co.
Jennison-Wright Co.
National Lumber & Creosoting Co.

Piling, Sheet Steel.
American Bridge Co.
Carnegie Steel Co.

Pilot Beams, Cast Steel.
General Steel Castings Corp.
Gould Coupler Co., The

Pilots, Cast Steel.
General Steel Castings Corp.
Locomotive Finished Material Co.

Pins, Airbrake.
Steel Car Forge Company.

Pins, Center.
Miner, W. H.

Pins, Coupler Knuckle.
McConway & Torley Co.
National Malleable & Steel Castings Co.

Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works
Miner, Inc., W. H.
Standard Steel Works Co.
Union Asbestos & Rubber Corp.

Pipe Coverings.
Carey & Co., Philip, The.
Johns-Manville Corp.

Pipe Fittings—(See Fittings, Pipe).

Pipe, Metal Culvert.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Republic Steel Corp.

Pipe, Steel Signal.
National Tube Co.

Pipe, Wrought Iron.
Byers Co., A. M.
Reading Iron Co.

Planers, Plate.
Ryerson & Son, Jos. T.
Sellers & Co., Inc., Wm.

Plates.
Steel Car Forge Co.

Plates, Follower.
Steel Car Forge Co.

Plates, Boiler, Firebox—(See Steel Firebox).

Plates, Center—(See Bearings, Center).

Plates, Iron & Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Interstate Iron & Steel Co.
Ryerson & Son, Joseph T.

Plates, Tie.
Illinois Steel Co.
Inland Steel Company.
Interstate Iron & Steel Co.
Railroad Supply Co.
Tennessee Coal, Iron & Railroad Co.

Plates, Tin and Terne.
American Sheet & Tin Plate Co.

Platforms, Car.
Gould Coupler Co., The.
Standard Coupler Co.

Platforms, Cast Steel, Passenger Car
General Steel Castings Corp.

Plows, Railroad and Grading.
Western Wheeled Scraper Co.

Plows, Snow.
American Locomotive Co.
Brill Co., The J. G.
Clark Tructractor Co.
Jordan Co., O. F.
Q & C Co., The.

Plugs, Arch Tube.
Prime Mfg. Co., The.

Plugs, Oil & Grease Cup.
Prime Mfg. Co., The.

Plugs, Washout.
Prime Mfg. Co., The.

Plush, Mohair.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Pneumatic Tools.
Ingersoll-Rand Co.

Poles.
Central Coal & Coke Co.
General Electric Supply Corp.
Graybar Electric Co.

Poles, Creosoted.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Poles, Signal.
General Railway Signal Co.
International Creosoting & Construction Co.
Union Switch & Signal Co.
Whiting Corporation.

Poles, Steel Tubular.
Graybar Electric Co.
National Tube Co.

Poles, Zinc Metal Arsenite Treatment.
Curtin-Howe Corp.

Posts, Fence.
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Posts, Fence, Creosoted.
Inland Steel Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Posts, Steel Fence.
American Steel & Wire Co.
Q & C Co., The.

Powder, Blasting—(See Explosives).

Powdered Coal Equipment.
Muhlfeld, John E.

Power Plants.
General Electric Co.
Muhlfeld, John E.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Power Shovels.
American Hoist & Derrick Co.
Northwest Engineering Co.

Power Transmission Supplies.
Sellers & Co., Inc., Wm.
Wrought Iron Co. of America.

Preservatives, Wood.
Century Wood Preserving Co.
Jennison-Wright Co.

Presses, Flanging Hydraulic.
Birdsboro Steel Foundry & Mach. Co.

Presses, Hydraulic.
Birdsboro Steel Foundry & Mach Co.

Presses, Wheel.
Birdsboro Steel Foundry & Mach Co.
Sellers & Co., Inc., Wm.

Pulverizers, Coal — (See Crushers, Coal).

Pullshovels.
American Hoist & Derrick Co.
Whiting Corporation.

Pumping Stations.
Fairbanks-Morse & Co.

Pump Liners, Monel Metal.
International Nickel Co., The.

Pump Rods, Monel Metal.
International Nickel Co., The.

Pump Shafts, Monel Metal.
International Nickel Co., The.

Pumps, Hydraulic.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Pumps & Pumping Machinery.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Pumps, Vacuum.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Punching and Shearing Machines.
Ryerson & Son, Joseph T.

Pushers, Coal.
Standard Stoker Co.

Pyrometers, Superheated Steam.
Superheater Co., The.

Rail Anchors.
Bethlehem Steel Co.
P. & M. Co., The.

Rail-Bonds.
American Steel & Wire Co.
General Cable Corp.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Rail Braces — (See Braces, Rail).

Rail Cranes.
American Hoist & Derrick Co.

Rail Reclamation Equipment.
Ryerson & Son, Joseph T.

Railroad Shops.
United Engineers & Constructors, Inc.

Rail Splice Plates — (See Joints, Rail).

Railroad Structures — (See Engineers and Contractors; also Building).

Rails.
Bethlehem Steel Co.
Carnegie Steel Co.
Hyman-Michaels Co.
Illinois Steel Co.
Inland Steel Co.
Tennessee Coal, Iron & Railroad Co.
Thomson Rail Corp.

Rails, Relaying.
Hyman-Michaels Co.

Railway Signals.
General Electric Supply Corp.

Rattan.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Receivers, Air.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.

Recorders, Speed & Cut-off.
Valve Pilot Co.

Rectifiers for Signal Work.
General Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.

Reducing Valves.
Vapor Car Heating Co., Inc.

Reflectors, Headlight.
Sunbeam Electric Mfg. Co.

Refrigerators.
American Radiator Co.
Wine Railway Appliance Co.

Regulators, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Relays.
General Railway Signal Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Removers, Paint & Varnish.
Oakite Products, Inc.

Repair Parts, Stoker.
Standard Stoker Co.
Q & C Company, The.

Retorts, Creosoting.
Graver Tank & Mfg. Corp.

Reverse Gear, Power.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Rivet Cutters.
Ingersoll-Rand Co.
Interstate Iron & Steel Co.

Riveters, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.

Riveting Machines.
Ingersoll-Rand Co.

Rivets.
Inland Steel Co.
Neely Nut & Bolt Co.
Ryerson & Son, Joseph T.
Pressed Steel Car Co.
Russell, Burdsall & Ward Bolt and Nut Co.

Rods.
Neely Nut & Bolt Co.

Rolled Steel.
Carnegie Steel Co.

Roller Bearings (See Bearings, Roller).

Rolls, Bending & Straightening.
Birdsboro Steel Foundry & Mach. Co.

Roof Slabs, Concrete.
Federal American Cement Tile Co.

Roofing, Asbestos.
Carey & Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.

Roofing, Buildings.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.

Roofing, Car.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey & Co., Philip, The.
Lehon Co., The.
Hutchins Car Rfg. Co.
Johns-Manville Corp.
Tuco Products Corp.
Union Metal Products Co.

Roofing, Corrugated.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey Co., Philip, The.
Johns-Manville Corp.

Roofing, Tile.
Federal American Cement Tile Co.

Roofing, Tile, Cement.
Federal American Cement Tile Co.

Roofing, Tin.
American Sheet & Tin Plate Co.

Rope, Wire — (See Wire Rope).

Rust Preventatives.
Dearborn Chemical Co.
Oakite Products, Inc.

Safe Ends.
National Tube Co.

Sand Drying Plants.
Roberts & Schaefer Co.

Sand Plants.
Railway Engineering Equipment Co.

Sanitary Products.
West Disinfecting Co.

Sash Balances.
Tuco Products Co.

Saws, Circular Metal.
Ryerson & Son, Joseph T.

Saws, High Speed, Friction.
Ryerson & Son, Joseph T.

Saws, Portable Rail.
Industrial Brownhoist Corp
Q & C Co., The.

Scales.
Fairbanks-Morse & Co.

Scrapers, Wheeled and Drag.
Western Wheeled Scraper Co.

Screens, Passenger Car.
Tuco Products Corp.

Seats, Car.
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

Seats, Coach.
Brill Co., The J. G.

Shafting.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.
Standard Steel Works Co.

Shapers.
Ryerson & Son, Joseph T.

Shapes, Pressed Steel.
Pressed Steel Car Co.
Sellers & Co., Inc., Wm.

Shapes, Structural.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheds, Train.
American Bridge Co.
Inland Steel Co.

Sheets, Black and Galvanized.
Allegheny Steel Co.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Blue Annealed.
Allegheny Steel Co.

Sheets, Car & Building.
American Rolling Mill Co.

Sheets, Corrugated.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Carnegie Steel Co.
Johns-Manville Corp.
Ryerson & Son, Joseph T.

Sheets, Corrugated and Plain.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheets, Electrical.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Iron & Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.

Sheets, Locomotive Jacket.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co
Inland Steel Co.

Sheets, Polished or Planished. Iron.
American Rolling Mill Co.
American Sheet & Tin Plate Co.

Sheets, Steel.
American Rolling Mill Co., The.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sherardising Plants.
General Electric Co.

Shop Calling Systems—(See Systems, Communication)

Shops, Railroad—(See Buildings, Iron, Steel and Steel Concrete).

Shovels & Draglines.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.

Shovels, Gasoline & Electric.
American Hoist & Derrick Co.

Shovels, Steam, Gasoline & Electric.
American Hoist & Derrick Co.
Orton Crane & Shovel Co.

Siding, Bldg., Car, Corrugated & Plain.
Kinnear Mfg. Co.
American Rolling Mill Co.
American Sheet & Tin Plate Co.
Inland Steel Co.

Siding, Corrugated & Plain.
Carey & Co., Philip, The.
Johns-Manville Corp.

Siding, Iron & Steel.
American Rolling Mill Co.

Signal Accessories.
Electric Storage Battery Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Signals, Automatic Cab.
General Railway Signal Co.
Union Switch & Signal Co.

Signal Blades.
General Railway Signal Co.
Union Switch & Signal Co.

Signals, Crossing.
Union Switch & Signal Co.

Signals, Crossing Protection.
General Railway Signal Co.
Railroad Supply Co.

Signals, Railway.
General Electric Co.
Union Switch & Signal Co.

Signs, Highway Crossing.
Railroad Supply Co.

Silico Manganese.
Vanadium Corp. of America

Silicon.
Electro Metallurgical Sales Corp.

Slabs, Concrete Floor.
American Cement Tile Mfg. Co.
Federal Cement Tile Co.

Slag, Blast Furnace.
Carnegie Steel Co.

Slotting Machines.
Sellers & Co., Inc., Wm

Slotting Machines, Locomotive Cylinder.
American Steel & Wire Co.

Sludge Removers.
Bird-Archer Co., The.

Soap, Liquid.
West Disinfecting Co.

Snow Plows.
Jordan Co., O. F.

Solder.
National Bearing Metals Corp.
Westinghouse Elec. & Mfg. Co.

Speed Indicators & Recorders.
Valve Pilot Corp.

Spelter—(See Zinc).

Spikes.
American Steel & Wire Co.
Bethlehem Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Splice Bars, Angle.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.

Spreaders, Ballast.
Jordan Co., O. F.

Spring, Plates or Seats.
Allegheny Steel Co.
National Malleable & Steel Castings Co.
Union Spring & Mfg. Co.

Springs.
American Steel Foundries Co.
American Steel & Wire Co.
Pittsburgh Spring & Steel Co.
Railway Steel Spring Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Switch & Signal Co.

Springs, Shop Equipment.
Ryerson & Son, Joseph T.

Springs, Vanadium Steel.
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Staybolts.
American Locomotive Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Flannery Bolt Co.
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Staybolts, Hollow.
Falls Hollow Staybolt Co.
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Standard Steel Works Co.

Steel, Firebox.
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Illinois Steel Co.

Steel, Heat Treated.
Interstate Iron & Steel Co.

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Steel, Open Hearth.
Carnegie Steel Co.
Illinois Steel Co.

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Century Wood Preserving Co.
International Creosoting & Construction Co.

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Union Switch & Signal Co.

Switch Ties.
International Creosoting & Construction Co.

Switch Ties, Creosoted.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

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General Electric Co.
Graybar Electric Co.
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Locomotive Firebox Co.

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United Engineers & Constructors, Inc.

Testers, Boiler.
Sellers & Co., Inc., Wm.

Testers, Gage.
Ashton Valve Co.

Testers, Rail.
Sperry Products, Inc.

Testers, Staybolt.
Flannery Bolt Co.

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Vapor Car Heating Co., Inc.

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American Throttle Co.

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Bethlehem Steel Co.
Illinois Steel Co.
Railroad Supply Co.

Ties, Creosoted.
International Creosoting & Construction Co.
Jennison-Wright Co.
National Lumber & Creosoting Co.

Ties, Steel.
American Bridge Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Ties, Wood.
Curtin-Howe Corp.
International Creosoting & Construction Co.

Tile, Cement, Concrete.
Federal American Cement Tile Co.

Timber.
Central Coal & Coke Co.
Curtin-Howe Corp.

Tires.
Firestone Tire & Rubber Co.
General Tire & Rubber Co.
Goodyear Tire & Rubber Co.
Goodrich Rubber Co., B. F.

Timber, Creosoted.
Century Wood Preserving Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Tires, Steel.
Edgewater Steel Co.
Midvale Co., The.
Railway Steel Spring Co.
Standard Steel Works Co.

Tools, High Speed Steel.
Bethlehem Steel Co.
Bird-Archer Co., The.

Towers, Floodlight.
Pyle-National Co.

Track Skates.
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Tractors.
Caterpillar Tractor Co.
Elwell-Parker Electric Co.
Industrial Lumber Co.
International Creosoting & Construction Co.
West Coast Lumber Trade Extension Bureau.

Tractors, Industrial.
Elwell-Parker Electric Co.
International Harvester Co.

Tractors, Turntable.
Nichols & Bros., Geo. P.

Train Control Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Tramways, Wire Rope.
American Steel & Wire Co.

Transfer Tables.
American Bridge Co.
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Nichols & Bros., Geo. P.
Whiting Corporation.

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General Electric Supply Corp.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Trap Doors.
Edwards Co., O. M.

Trap Doors & Fixtures.
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Treads, Bridge Floor.
Carnegie Steel Co.

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Trucks, Car.
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Birdsboro Steel Foundry & Mach. Co.
Brill Co., The J. G.
Flexible Truck Co.
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Gould Coupler Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
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Trucks, Cast Steel Tender
General Steel Castings Corp.

Trucks, Cast Steel, Electric Car
General Steel Castings Corp.

Trucks, Cast Steel, Car & Locomotive
General Steel Castings Corp.

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Clark Tructractor Co.

Trucks, Electric Storage Battery.
Elwell-Parker Electric Co.
Whiting Corporation.

Trucks, Industrial.
Elwell-Parker Electric Co.

Trucks, Motor.
Dodge Motor Truck Corp.
General Motors Truck Co.
International Harvester Co.
Reo Motor Car Co.
White Co., The.

Trucks, Tender.
Flexible Truck Co.

Trucks, Trailer.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.

Tubes, Arch.
National Tube Co.

Tubes, Boiler.
Allegheny Steel Co.
Bethlehem Steel Co.
National Tube Co.
Ryerson & Son, Joseph T.

Tubes, Boiler, Charcoal Iron.
Bethlehem Steel Co.
Reading Iron Co.

Tubes, Staybolt.
Fails Hollow Staybolt Co.

Tubes, Tire.
Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.

Tubing.
Aluminum Co. of America.

Tubing, Seamless Steel.
National Tube Co.

Tungsten Metal.
Vanadium Corp. of America.

Turbo Generators.
Electric Service Supplies Co.
General Electric Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Turnbuckles.
American Bridge Co.
American Steel & Wire Co.
Ryerson & Son, Joseph T.

Turntable Tractors.
Nichols & Bros., Geo. P.

Turntables.
American Bridge Co.
Industrial Brownhoist Corp.

Typewriter Ribbons.
Remington-Rand Business Service.

Typewriters.
Remington-Rand Business Service.

Uncoupling Device.
Hutchins Car Rfg. Co.

Undercrossings, Corrugated Iron.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Underfloor Duct.
General Electric Supply Corp.

Underfloor Duct, Fibre and Metal.
Johns-Manville Corp.

Underframes, Cast Steel. Tender
General Steel Castings Corp.

Underframes, Cast Steel, Freight Car.
General Steel Castings Corp.

Underframes, Steel.
Bettendorf Co., The.
Brill Co., The J. G.
Pressed Steel Car Co.
St. Louis Car Co.

Underground Conduit.
General Electric Supply Corp.

Upholstery, Car.
Brill Co., The J. G.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Valve Gears, Locomotive.
Pyle-National Co.

Valves, Air Brake.
Westinghouse Air Brake Co.

Valves, Back Pressure Acetylene.
Oxweld Railroad Service Co., The.

Valves, Blow-Off.
Bird-Archer Co., The.

Valves, Check & Angle Steam
Sellers & Co., Inc., Wm.

Valves, Drifting.
Ardco Mfg. Co.
Sellers & Co., Inc., Wm.

Valves, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.

Valves, Piston.
Franklin Railway Supply Co., Inc.

Valves, Pop, Safety & Relief.
Ashton Valve Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Valves, Pressure Regulating
Gold Car Htg. & Ltg. Co.

Valves, Throttle.
Bradford Corporation.

Vanadium.
Electro Metallurgical Sales Corp.

Varnish Powder.
Aluminum Co. of America.

Varnishes.
du Pont de Nemours & Co., Inc., E. I.
General Electric Supply Corp.
Sherwin-Williams Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Ventilators, Car
Gold Car Htg. & Ltg. Co.

Ventilators, Shop & Roundhouse.
Carey Co., Philip, The.
Johns-Manville Corp.

Wardrobes, Rolling and Disappearing Front — (See Lockers).

Washers.
National Malleable & Steel Castings Co.
Reliance Mfg. Co.
Ryerson & Son, Joseph T.
Wine Railway Appliance Co.

Washers, Boiler.
Sellers & Co., Inc., Wm.

Washers, Lock.
Reliance Manufacturing Co., The.

Water Alarms — (See Low Water Alarms).

Waterproofing Materials and Compounds.
Carey Co., Phillip, The.
Lehon Co., The.
Johns-Manville Corp.

Water Purifying Materials & Compounds.
Bird-Archer Co., The.
Dearborn Chemical Co.

Water Softening & Purifying.
Bird-Archer Co., The.
Dearborn Chemical Co.
Graver Tank & Mfg. Corp.

Weather Stripping.
Tuco Products Corp.

Wedges, Automatic.
Franklin Railway Supply Co., Inc.

Wedges, Journal Box.
American Steel Foundries.
Gould Coupler Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Company.
Symington Co., The.

Weed Killer.
Q & C Co., The.

Welding Machines, Acetylene.
Oxweld Railroad Service Co., The.
Ryerson & Son, Joseph T.
Westinghouse Elec. & Mfg. Co.

Welding Machines, Electric.
General Electric Co.
Ryerson & Son, Joseph T.

Welding Machines, Flue.
Ryerson & Son, Joseph T.

Welding Materials.
Oxweld Railroad Service Co.
Franklin Railway Supply Co., Inc.

Welding Process.
Oxweld Railroad Service Co.

Welding Rods.
American Steel & Wire Co.
General Electric Supply Corp.
Oxweld Railroad Service Co., The.
Ryerson & Son, Joseph T.

Welding Supplies.
General Electric Co.
Oxweld Railroad Service Co., The.

Welding and Cutting Apparatus—(See Cutting and Welding Apparatus).

Well Casings, Corrugated Iron.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Wheel Centers, Driving.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Mach. Co.
Edgewater Steel Co.
Hunt-Spiller Mfg. Corp.
Standard Steel Works Co.
Union Steel Casting Co.

Wheels, Car and Locomotive.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works.
Bethlehem Steel Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Railway Steel Spring Co.
Standard Steel Works Co.

Wheels, Cast Iron, Chilled Tread.
Assn. of Mfrs. of Chilled Car Wheels.
Graybar Electric Co.
Griffin Wheel Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Wheels, Mine Car.
Carnegie Steel Co.
Edgewater Steel Co.
Mt. Vernon Car Mfg. Co.
Standard Steel Works Co.

Wheels, Passenger Car.
Carnegie Steel Co.
Illinois Steel Co.
Edgewater Steel Co.
Pullman Car & Mfg. Corp.
Standard Steel Works Co.

Wheels, Steel and Steel Tired
American Locomotive Co.
American Steel Foundries.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Railway Steel Spring Co.
Standard Steel Works Co.

Wheels, Wrought Steel.
American Rolling Mill Co.
Bethlehem Steel Co.
Carnegie Steel Co.
Edgewater Steel Co.
Standard Steel Works Co.

Whistles.
Ashton Valve Co.

Whistles, Locomotive.
General Electric Co.
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Windows, Locomotive Cab, Clear Vision.
Prime Manufacturing Co.

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General Cable Corp.
Kerite Insulated Wire & Cable Co.
Okonite Co., The

Wire, Fence.
American Steel & Wire Co.

Wire, Insulated.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Cable Corp.
General Electric Co.
Graybar Electric Co.
Kerite Insulated Wire & Cable Co.
Okonite Co., The.

Wire, Rail Bond.
American Steel & Wire Co.
General Cable Corp.
Graybar Electric Co.

Wire Rope Clips.
American Hoist & Derrick Co.

Wire Rope.
American Steel & Wire Co.

Wire, Telephone & Telegraph.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Cable Corp.
Graybar Electric Co.

Wire, Welding.
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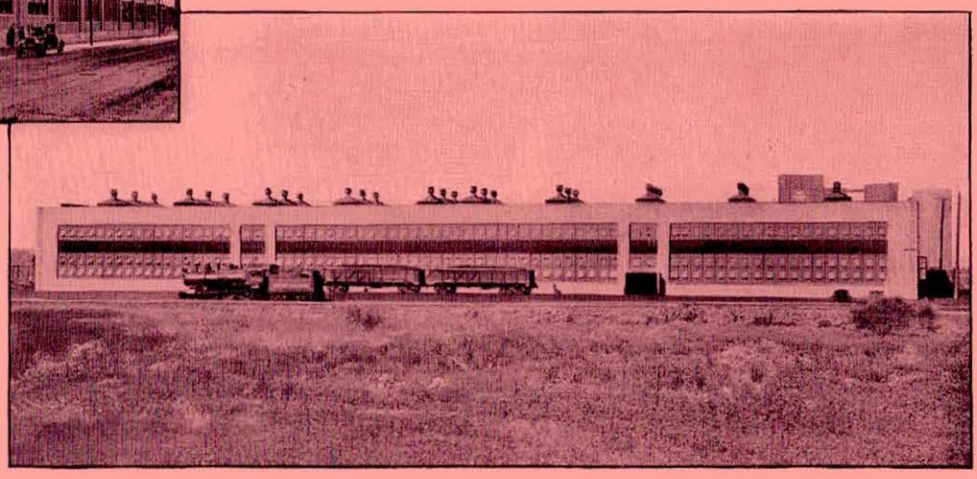
Chicago, Rock Island & Pacific Railway

Commissary and Electrical Building, Chicago, Illinois
1928



Car Repair Shop
El Reno, Oklahoma
1929

80% Repeat Orders ...

DURING the past ten years 80% of our work for railroads has been repeat orders — a significant fact to those contemplating new shops, terminals, power plants or other facilities.

Railroads we have served more than once—with the number of major authorizations—are as follows:

Atlantic Coast Line Railroad 2
Baltimore & Ohio Railroad 4
Boston and Maine Railroad 4
Canadian Pacific Railway 4
Central Railroad of New Jersey 4
Chesapeake & Ohio Railway 3
Chicago, Burlington & Quincy Railroad 2
Chicago, Rock Island & Pacific Railway 3
Chicago & Alton Railroad 2
Erie Railroad 2
Lehigh Valley Railroad 5
Missouri Pacific Railway 4
New York, New Haven & Hartford Railroad 3
New York, Westchester & Boston Railway 5
Pennsylvania Railroad 9
Southern Railway 6
Terminal Railroad Association of St. Louis 3
Wabash Railway 3

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INCORPORATED

DWIGHT P. ROBINSON, PRESIDENT

PHILADELPHIA NEW YORK NEWARK BOSTON CHICAGO
LOS ANGELES MONTREAL TORONTO BUENOS AIRES RIO DE JANEIRO

MAXIMUM RETURN TO CLIENTS PER DOLLAR INVESTED

AS TO THE FUTURE*

"The business depression and the resultant reduction in volume of railroad business will exert a minimum deterring effect on the amount of signaling construction for 1931, as compared with that in other railroad fields.

"The underlying reason for continued activity in signaling is that the benefits produced include not only a reduction in train delays, but of perhaps more importance at this time is the direct saving in operating expense . . . which is particularly true in the consolidation of the control of interlockings in centralized traffic control systems and car retarder installations.

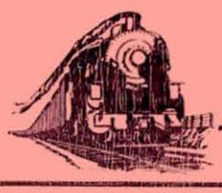
"Where savings of 40 per cent or more are evident under present traffic conditions, the quicker the installation is made the better as a means of reducing operating costs as soon as possible.

"Centralized traffic control speedily proved its place in railroading. On busy single-track lines the power operated switches reduce delays and the controlled signals keep trains moving. Likewise, such a system is also effective for either-direction operation of trains on one or more tracks of a multiple track line, as for example on the Boston & Maine. In the near future, centralized traffic control is expected to be installed on important single-track lines to direct train movements, with perhaps only a few passing track or junction switches power operated. The cost of the installation is to be justified primarily on the savings in operating expenses . . ."

*Excerpt from **RAILWAY SIGNALING**, January 1931, page 26.

UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.



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Signals Aid Modern Motive Power to Produce More Ton-Miles Per Train-Hour